IN THE CLAIMS:

1. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one neutral, positive or negative increased binding energy hydrogen species having a binding energy:

(i) greater than the binding energy of the corresponding ordinary hydrogen species, or

(ii) greater than the binding energy of any hydrogen species for which the corresponding ordinary hydrogen species is unstable or is not observed because the ordinary hydrogen species' binding energy is less than thermal energy of the ordinary hydrogen species at ambient conditions, or is negative; and

(b) at least one other element,

said reactor comprising:

a vessel;

optionally an electron source associated with said vessel for forming a negative increased binding energy hydrogen species;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

2. (Original) A reactor of claim 1 wherein the increased binding energy hydrogen species is a hydride ion having a binding energy greater than about 0.8 eV.

3. (Original) A reactor of claim 1 or 2 wherein said source of increased binding energy hydrogen atoms is a hydrogen catalysis cell selected from a group consisting of an electrolytic cell, a gas cell, a gas discharge cell, and a plasma torch cell.

4. (Original) A reactor of claim 3 wherein said hydrogen catalysis cell comprises a

second vessel containing

a source of atomic hydrogen;

at least one of a solid, molten, liquid, or gaseous catalyst having a net enthalpy of reaction of at least m/2 • 27 eV, where m is an integer,

whereby the hydrogen atoms react with the catalyst in the second vessel thereby producing a hydrogen atom having a binding energy of about $13.6/(1/p)^2$ eV where p is an integer greater than 1.

5. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one hydrino hydride ion having a binding energy greater than 0.8 eV and

(b) at least one other element,

said reactor comprising:

a vessel;

an electron source associated with said vessel;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

6. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one hydrino atom having a binding energy of about $13.6/n^2$ eV, wherein n is a fraction whose numerator is 1 and denominator is an integer greater than 1, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

7. (Previously Presented) A reactor for preparing a compound comprising

(a) a hydrino atom having a binding energy greater than about 13.6 eV, and

(b) at least one other element, said reactor comprising:

a vessel;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

8. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one hydrino hydride ion having a binding energy of about 0.65 eV, and

(b) at least one other element,

said reactor comprising:

a vessel;

an electron source associated with said vessel;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

9. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one hydrino hydride ion formulated from at least one hydrino atom, and

(b) at least one other element,

said reactor comprising:

a vessel;

an electron source associated with said vessel;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

10. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one hydrino hydride ion having a binding energy represented by

$$Binding\ Energy = \frac{\hbar^2\sqrt{s(s+1)}}{8\mu_e a_0^2\left[\frac{1+\sqrt{s(s+1)}}{p}\right]^2} - \frac{\pi\mu_0 e^2\hbar^2}{m_e^2 a_0^3}\left(1+\frac{2^2}{\left[\frac{1+\sqrt{s(s+1)}}{p}\right]^3}\right)$$

where p is an integer greater than 1, s = ½, ħ is Plank's constant bar, μ_0 is the permeability of vacuum, m_e is the mass of the electron, μ_e is the reduced electron mass, a_0 is the Bohr radius, and *e* is the elementary charge; and

(b) at least one other element,

said reactor comprising:

a vessel;

an electron source associated with said vessel;

a source of hydrino atoms associated with said vessel; and

a source of at least one other element associated with said vessel.

11. (Previously Presented) A reactor for preparing a compound comprising

(a) an increased binding energy hydrogen species formed by the reaction of a catalyst with atomic hydrogen, and

(b) at least one other element,

said reactor comprising:

a vessel;

optionally an electron source associated with said vessel in the case the increased binding energy hydrogen species has a negative charge;

a source of hydrogen atoms;

a source of catalyst for catalyzing the formation of the increased binding energy hydrogen species from said hydrogen atoms; and

a source of at least one other element associated with said vessel.

12. (Previously Presented) A reactor for preparing a compound comprising

(a) an increased binding energy hydrogen species formed by the reaction of a catalyst with molecular hydrogen, and

(b) at least one other element,

said reactor comprising:

a vessel;

optionally an electron source associated with said vessel in the case the increased binding energy hydrogen species has a negative charge;

a catalyst for catalyzing the formation of the increased binding energy hydrogen species from molecular hydrogen;

a source of molecular hydrogen; and

a source of at least one other element associated with said vessel.

13. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one dihydrino molecule having a first binding energy of about $15.5/n^2$ eV, wherein n is a fraction whose numerator is 1 and denominator is an integer greater than 1, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of dihydrino molecules or ions associated with said vessel; and

a source of at least one other element associated with said vessel.

14. (Previously Presented) A reactor for preparing a compound comprising

(a) at least one dihydrino molecular ion having a first binding energy of about $16.4/n^2$ eV, wherein n is a fraction whose numerator is 1 and denominator is an integer greater than 1, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of dihydrino molecules or ions associated with said vessel; and

a source of at least one other element associated with said vessel.

15. (Previously Presented) A reactor for preparing a compound comprising (a) one or more increased binding energy hydrogen species selected from the group consisting of H_n, H_n^-, and H_n^+, where n is a positive integer for H_n and H_n^- and n is a positive integer greater than 1 for H_n^+, and (b) at least one other element,

said reactor comprising:

a vessel;

optionally an electron source associated with said vessel in the case of H_n^-;

a source of the increased binding energy hydrogen species; and

a source of at least one other element associated with said vessel.

16. (Previously Presented) A reactor for preparing a compound comprising (a) $H_4^+(1/p)$, wherein p is an integer, and (b) at least one other element,

said reactor comprising:

a vessel;

a source of $H_4^+(1/p)$; and

a source of at least one other element associated with said vessel.

17. (Previously Presented) A reactor for preparing a compound comprising (a) an increased binding energy hydrogen molecule having a first binding energy greater than about 15.5 eV, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of the increased binding energy hydrogen molecule; and

a source of at least one other element associated with said vessel.

18. (Previously Presented) A reactor for preparing a compound comprising

(a) an increased binding energy molecular hydrogen ion having a binding energy greater than about 16.4 eV, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of the increased binding energy molecular hydrogen ion; and

a source of at least one other element associated with said vessel.

19. (Previously Presented) A reactor for preparing a compound comprising

(a) an increased binding energy hydride ion selected from the group of increased binding energy hydride ions having a binding energy of about 3, 7, 11, 17, 23, 29, 36, 43, 49, 55, 61, 66, 69, 71, 72, 71, 69, 64, 57, 47, 35, 19, and 0.65 eV, and

(b) at least one other element,

said reactor comprising:

a vessel;

an electron source associated with said vessel;

a source of hydrino atoms; and

a source of at least one other element associated with said vessel.

20. (Previously Presented) A reactor for preparing a compound comprising

(a) a trihydrino molecular ion, $H_3^+(1/p)$ having a binding energy greater than 22.6

eV, wherein p is an integer greater than 1, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of the trihydrino molecular ion; and

a source of at least one other element associated with said vessel.

21. (Previously Presented) A reactor for preparing a compound comprising

(a) a trihydrino molecular ion, $H_3^+(1/p)$, having a binding energy of about $22.6/(1/p)^2$ eV, wherein p is an integer greater than 1, and

(b) at least one other element,

said reactor comprising:

a vessel;

a source of the trihydrino molecular ion; and

a source of at least one other element associated with said vessel.

22. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element is selected to provide a desired compound.

23. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more protons.

24. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more ordinary H_3^+.

25. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more organic molecules.

26. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more inorganic compounds.

27. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more metals.

28. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more semiconductors.

29. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises at least one selected from the group consisting of ions, molecules and compounds containing an increased binding energy species.

30. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more normal hydrogen atoms.

31. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more normal hydrogen molecules.

32. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises a negatively charged anion selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

33. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises a negatively charged anion selected from the group consisting of carbonate ions and sulfate ions.

34. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element is different from a material said vessel is formed from.

35. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more neutral atoms, negatively or positively charged atomic and molecular ions, and free radicals.

36. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more Group VIB and Group IB elements.

37. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more alkali, alkaline earth, transition metal, inner transition metal, rare earth, lanthanide, or actinide cations.

38. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises one or more ordinary hydride ions.

39. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises ordinary hydrogen molecular ions.

40. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said at least one other element comprises a dopant or dopant component.

41. (Previously Presented) A reactor according to claim 40, wherein said dopant or dopant component comprises silicon, germanium, gallium, indium, arsenic, phosphorous, antimony, boron, aluminum, Group III elements, Group IV elements or Group V elements.

42. (Previously Presented) A reactor according to claim 1, wherein said source of hydrino atoms comprises a source of catalyst for converting hydrogen atoms into hydrino atoms and a source of hydrogen atoms.

43. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst is adapted to provide a resonant absorption with the energy released by said hydrogen atoms when said hydrogen atoms undergo said transition to a lower energy state.

44. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a salt of rubidium.

45. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a salt potassium.

46. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a salt of titanium.

47. (Previously Presented) A reactor according to claim 42, wherein said source of

catalyst comprises a salt of rubidium which is selected from the group consisting of RbF, RbCl, RbBr, RbI, Rb_2S_2, RbOH, Rb_2SO_4, Rb_2CO_3, and Rb_3PO_4.

48. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a salt of potassium which is selected from the group consisting of KF, KCl, KBr, KI, K_2S_2, KOH, K_2SO_4, K_2CO_3 and K_3PO_4.

49. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises K_2CO_3.

50. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a salt of one or more cations and at least one anion selected from the group consisting of oxides, nitrates, sulfates, phosphates, carbonates and hydroxides.

51. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises hydrino atoms having a binding energy of about $E_b = 13.6/n^2$ eV, where n is a fraction whose numerator is 1 and denominator is an integer greater than 1.

52. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises potassium and has a net enthalpy of reaction of 27.28 eV.

53. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises an ion selected from the group consisting of (Rb^+), (Mo^{2+}), and (Ti^{2+}) in solution.

54. (Previously Presented) A reactor according to claim 42, wherein said source of

catalyst comprises at least one ion selected from the group consisting of (Al^{2+}), (Ar^{+}), (Ti^{2+}), (As^{2+}), (Rb^{+}), (Mo^{2+}), (Ru^{2+}), (In^{2+}), and (Te^{2+}).

55. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst is capable of adsorbing an energy in the range of 26.8 to 28.5 eV.

56. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one pair of ions selected from the group consisting of: (Sn^{4+}, Si^{4+}), (Pr^{3+}, Ca^{2+}), (Sr^{2+}, Cr^{2+}), (Cr^{3+}, Tb^{3+}), (Sb^{3+},Co^{2+}), (Bi^{3+}, Ni^{2+}), (Pd^{2+}, In^{+}), (La^{3+}, Dy^{3+}), (La^{3+}, Ho^{3+}), (K^{+}, K^{+}) , (V^{3+}, Pd^{2+}), (Lu^{3+}, Zn^{2+}), (As^{3+}, Ho^{3+}), (Mo^{5+}, Sn^{4+}), (Sb^{3+}, Cd^{2+}), (Ag^{2+},Ag^{+}), (La^{3+}, Er^{3+}), (V^{4+}, B^{3+}), (Fe^{3+}, Ti^{3+}), (Co^{2+}, Ti^{+}), (Bi^{3+}, Zn^{2+}), (As^{3+}, Dy^{3+}), (Ho^{3+}, Mg^{2+}), (K^{+}, Rb^{+}), (Cr^{3+}, Pr^{3+}), (Sr^{2+}, Fe^{2+}), (Ni^{2+}, Cu^{+}), (Li^{+}, Pb^{2+}), (Sr^{2+}, Mo^{2+}), (Y^{3+}, Zr^{4+}), (Cd^{2+}, Ba^{2+}), (Ho^{3+}, Pb^{2+}), (Eu^{3+}, Mg^{2+}), (Er^{3+}, Mg^{2+}), (Bi^{4+}, Al^{3+}), (Ca^{2+}, Sm^{3+}), (V^{3+}, La^{3+}), (Gd^{3+}, Cr^{2+}), (Mn^{2+}, Ti^{+}), (Yb^{3+}, Fe^{2+}), (Ni^{2+}, Ag^{+}), (Zn^{2+}, Yb^{2+}), (Se^{4+}, Sn^{4+}), (Sb^{3+}, Bi^{2+}), and (Eu^{3+}, Pb^{2+}).

57. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a single electron ionization from a single species selected from the group consisting of atoms, ions, molecules, ionic compounds and molecular compounds.

58. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a single electron transfer between two species selected from the group consisting of atoms, ions, molecules, ionic compounds and molecular compounds.

59. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises two electron transfers between two species selected from the

group consisting of atoms, ions, molecules, ionic compounds and molecular compounds.

60. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises oxygen in combination with at least one atom selected from the group consisting of Cu, As, Pd, Te, Cs and Pt.

61. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one pair selected from the group consisting of: (B, Li^+), (S, Li^+), (Br, Li^+), (Pm^+, Li^+), (Sm^+, Li^+), (Tb^+, Li^+), (Dy^+, Li^+), (Sb^+, H^+) and (Bi^+, H^+).

62. (Currently Amended) A reactor according to claim 42, wherein said source of catalyst comprises at least one free atom selected from the group consisting of Be, Cu, Zn, Pd, Te and Pt.

63. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one pair selected from the group consisting of:

(He 0+ , Co 3+);	(O 1+ , Nd 4+);	(Al 2+ , Cl 5+);
(He 0+ , Ga 3+);	(O 1+ , Tb 4+);	(Al 4+ , Mn 8+);
(Li 0+ , Ni 3+);	(O 2+ , Ne 3+);	(Si 1+ , Mg 2+);
(Li 0+ , Xe 3+);	(O 3+ , Sb 6+);	(Si 1+ , V 2+);
(Li 0+ , Hg 3+);	(O 4+ , Fe 7+);	(Si 1+ , Tc 2+);
(Li 1+ , Na 4+);	(F 0+ , Al 2+);	(Si 1+ , Sn 2+);
(Li 1+ , Y 6+);	(F 0+ , Si 2+);	(Si 1+ , Hf 2+);
(Be 1+ , Bi 6+);	(F 0+ , Fe 2+);	(Si 1+ , Pb 2+);
(Be 2+ , Al 6+);	(F 0+ , Co 2+);	(Si 2+ , Co 3+);
(B 1+ , C 2+);	(F 0+ , Ru 2+);	(Si 2+ , Ga 3+);
(B 1+ , K 2+);	(F 0+ , In 2+);	(Si 2+ , Ge 3+);
(B 1+ , Ho 3+);	(F 0+ , Sb 2+);	(Si 2+ , Tl 3+);
(B 1+ , Er 3+);	(F 0+ , Bi 2+);	(Si 3+ , Ni 6+);
(B 1+ , Tm 3+);	(F 1+ , Sb 4+);	(Si 3+ , Rb 7+);
(B 1+ , Lu 3+);	(F 3+ , Fe 6+);	(Si 4+ , Al 6+);

(C 1+ , N 2+); (Ne 0+ , Sm 3+); (P 1+ , Mg 2+);
(C 1+ , V 3+); (Ne 0+ , Dy 3+); (P 1+ , Tc 2+);
(C 1+ , Tc 3+); (Ne 0+ , Ho 3+); (P 1+ , Sn 2+);
(C 1+ , Ru 3+); (Ne 0+ , Er 3+); (P 1+ , Hf 2+);
(C 1+ , Sn 3+); (Ne 0+ , Lu 3+); (P 1+ , Pb 2+);
(C 2+ , Mn 4+); (Ne 1+ , N 3+); (P 2+ , Ni 3+);
(C 2+ , Co 4+); (Ne 1+ , K 3+); (P 2+ , Cd 3+);
(N 0+ , Sr 2+); (Ne 1+ , V 4+); (P 2+ , Xe 3+);
(N 0+ , La 2+); (Ne 2+ , O 4+); (P 3+ , Nb 5+);
(N 0+ , Ce 2+); (Na 0+ , Al 2+); (P 5+ , C 5+);
(N 0+ , Pr 2+); (Na 0+ , Si 2+); (S 1+ , P 2+);
(N 0+ , Nd 2+); (Na 0+ , Fe 2+); (S 1+ , Se 2+);
(N 0+ , Pm 2+); (Na 0+ , Co 2+); (S 1+ , La 3+);
(N 0+ , Sm 2+); (Na 0+ , Ru 2+); (S 1+ , Ce 3+);
(N 0+ , Eu 2+); (Na 0+ , In 2+); (S 1+ , Au 2+);
(N 1+ , O 2+); (Na 0+ , Sb 2+); (S 2+ , Sr 3+);
(N 1+ , Si 3+); (Na 0+ , Bi 2+); (S 2+ , Cd 3+);
(N 1+ , P 3+); (Na 2+ , Ti 5+); (S 3+ , Cu 4+);
(N 1+ , Mn 3+); (Na 2+ , Kr 6+); (S 3+ , Rb 4+);
(N 1+ , Rh 3+); (Na 3+ , Y 7+); (S 4+ , O 4+);
(N 2+ , F 3+); (Mg 1+ , Rb 3+); (Cl 1+ , C 2+);
(N 3+ , Br 6+); (Mg 1+ , Eu 4+); (Cl 1+ , K 2+);
(O 0+ , Ti 2+); (Mg 3+ , Ne 5+); (Cl 1+ , Zr 3+);
(O 0+ , V 2+); (Mg 6+ , Cl 8+); (Cl 1+ , Eu 3+);
(O 0+ , Nb 2+); (Al 1+ , Sc 2+); (Cl 1+ , Tm 3+);
(O 0+ , Hf 2+); (Al 1+ , Zr 2+); (Cl 2+ , Te 4+);
(O 1+ , Ne 2+); (Al 1+ , Lu 2+); (Cl 2+ , Sm 4+);
(O 1+ , Ca 3+); (Al 2+ , S 5+); (Cl 2+ , Gd 4+);
(Cl 2+ , Ho 4+); (Sc 4+ , N 5+); (Mn 4+ , Ge 5+);
(Cl 2+ , Er 4+); (Ti 2+ , Ar 2+); (Fe 1+ , Sc 2+);
(Cl 3+ , Cl 4+); (Ti 2+ , Mo 3+); (Fe 1+ , Y 2+);
(Cl 5+ , Ni 6+); (Ti 4+ , O 5+); (Fe 1+ , Yb 2+);
(Cl 5+ , Cu 6+); (Ti 4+ , Zn 6+); (Fe 1+ , Lu 2+);
(Cl 5+ , Rb 7+); (Ti 4+ , As 6+); (Fe 2+ , S 3+);
(Ar 0+ , Ba 2+); (V 1+ , Sr 2+); (Fe 2+ , Cu 3+);
(Ar 0+ , Ce 2+); (V 1+ , La 2+); (Fe 2+ , Zn 3+);
(Ar 0+ , Pr 2+); (V 1+ , Ce 2+); (Fe 2+ , Br 3+);
(Ar 0+ , Nd 2+); (V 1+ , Pr 2+); (Fe 2+ , Zr 4+);
(Ar 0+ , Ra 2+); (V 1+ , Nd 2+); (Fe 2+ , Ce 4+);
(Ar 1+ , Ti 3+); (V 1+ , Pm 2+); (Fe 5+ , Sr 7+);
(Ar 2+ , C 3+); (V 1+ , Sm 2+); (Co 1+ , Mg 2+);
(Ar 3+ , K 4+); (V 1+ , Eu 2+); (Co 1+ , Cr 2+);
(Ar 3+ , Br 5+); (V 2+ , O 2+); (Co 1+ , Mn 2+);
(Ar 3+ , Mo 5+); (V 3+ , Mn 4+); (Co 1+ , Mo 2+);
(Ar 4+ , Y 5+); (V 3+ , Co 4+); (Co 1+ , Tc 2+);
(K 1+ , Si 3+); (V 4+ , Ar 6+); (Co 1+ , Pb 2+);
(K 1+ , P 3+); (V 4+ , Sc 5+); (Co 2+ , Cu 3+);
(K 1+ , Mn 3+); (V 5+ , Mg 5+); (Co 2+ , Zn 3+);
(K 1+ , Ge 3+); (V 6+ , Sc 8+); (Co 2+ , Br 3+);

(K 1+ , Rh 3+); (V 6+ , Br 8+); (Co 2+ , Zr 4+);
(K 1+ , Tl 3+); (Cr 1+ , Sc 2+); (Co 2+ , Ag 3+);
(K 2+ , He 2+); (Cr 1+ , Ti 2+); (Co 2+ , Ce 4+);
(K 2+ , Si 4+); (Cr 1+ , Zr 2+); (Co 2+ , Hf 4+);
(K 2+ , As 4+); (Cr 1+ , Lu 2+); (Co 4+ , Nb 6+);
(K 3+ , P 5+); (Cr 2+ , F 2+); (Co 5+ , Sc 6+);
(K 3+ , Zr 5+); (Cr 2+ , Na 2+); (Ni 1+ , Co 2+);
(K 4+ , Rb 6+); (Cr 2+ , Se 3+); (Ni 1+ , Ni 2+);
(K 5+ , Mg 4+); (Cr 2+ , Pd 3+); (Ni 1+ , Rh 2+);
(K 5+ , Kr 7+); (Cr 2+ , I 3+); (Ni 1+ , Cd 2+);
(K 6+ , Y 8+); (Cr 2+ , Hg 3+); (Ni 1+ , Sb 2+);
(Ca 1+ , C 2+); (Cr 3+ , O 3+); (Ni 2+ , Ne 2+);
(Ca 1+ , Sm 3+); (Cr 3+ , Ni 4+); (Ni 2+ , Ca 3+);
(Ca 1+ , Dy 3+); (Cr 4+ , O 4+); (Ni 2+ , Nd 4+);
(Ca 1+ , Ho 3+); (Cr 5+ , Ne 5+); (Ni 2+ , Tb 4+);
(Ca 1+ , Er 3+); (Cr 5+ , Fe 7+); (Ni 4+ , Rb 6+);
(Ca 1+ , Tm 3+); (Mn 1+ , V 2+); (Ni 6+ , Ar 8+);
(Ca 1+ , Lu 3+); (Mn 1+ , Nb 2+); (Cu 1+ , Ag 2+);
(Ca 2+ , O 3+); (Mn 1+ , Sn 2+); (Cu 1+ , I 2+);
(Ca 2+ , Ni 4+); (Mn 1+ , Hf 2+); (Cu 1+ , Cs 2+);
(Ca 3+ , Mn 5+); (Mn 2+ , Cu 3+); (Cu 1+ , Au 2+);
(Ca 3+ , Rb 5+); (Mn 2+ , Zn 3+); (Cu 1+ , Hg 2+);
(Ca 4+ , Cl 6+); (Mn 2+ , Br 3+); (Cu 2+ , Sm 4+);
(Ca 4+ , Ar 6+); (Mn 2+ , Zr 4+); (Cu 2+ , Gd 4+);
(Ca 4+ , Sc 5+); (Mn 2+ , Ce 4+); (Cu 2+ , Dy 4+);
(Ca 5+ , Y 7+); (Mn 2+ , Hf 4+); (Cu 3+ , K 4+);
(Sc 2+ , Ti 4+); (Mn 3+ , Mg 3+); (Cu 3+ , Br 5+);
(Sc 2+ , Bi 4+); (Mn 3+ , Te 5+); (Cu 3+ , Mo 5+);
(Cu 4+ , Rb 6+); (Se 1+ , Fe 2+); (Sr 1+ , Ga 2+);
(Cu 5+ , Mn 7+); (Se 1+ , Co 2+); (Sr 1+ , Te 2+);
(Zn 1+ , P 2+); (Se 1+ , Ge 2+); (Sr 1+ , Pt 2+);
(Zn 1+ , I 2+); (Se 1+ , Ru 2+); (Sr 1+ , Tl 2+);
(Zn 1+ , La 3+); (Se 1+ , In 2+); (Sr 2+ , C 3+);
(Zn 1+ , Au 2+); (Se 1+ , Bi 2+); (Sr 2+ , Mo 4+);
(Zn 1+ , Hg 2+); (Se 2+ , Te 3+); (Sr 3+ , Ar 4+);
(Zn 2+ , Ti 4+); (Se 3+ , Br 4+); (Sr 3+ , Sr 4+);
(Zn 2+ , Sn 4+); (Se 5+ , Y 7+); (Sr 3+ , Sb 5+);
(Zn 2+ , Bi 4+); (Br 1+ , P 2+); (Sr 3+ , Bi 5+);
(Zn 3+ , As 5+); (Br 1+ , I 2+); (Sr 4+ , Ar 5+);
(Zn 4+ , Sr 6+); (Br 1+ , La 3+); (Sr 4+ , Cu 5+);
(Zn 5+ , Mn 7+); (Br 1+ , Au 2+); (Y 2+ , Sr 3+);
(Zn 6+ , Mo 8+); (Br 3+ , He 2+); (Y 2+ , Cd 3+);
(Ga 1+ , Cr 2+); (Br 3+ , Si 4+); (Y 3+ , Se 5+);
(Ga 1+ , Mn 2+); (Br 3+ , Ge 4+); (Y 3+ , Pb 5+);
(Ga 1+ , Fe 2+); (Br 4+ , S 5+); (Y 4+ , Ti 5+);
(Ga 1+ , Ge 2+); (Br 4+ , Cl 5+); (Y 4+ , Zn 5+);
(Ga 1+ , Mo 2+); (Br 5+ , Sb 6+); (Y 5+ , Co 6+);
(Ga 1+ , Ru 2+); (Br 6+ , Ar 8+); (Y 6+ , K 7+);
(Ga 1+ , Bi 2+); (Kr 1+ , B 2+); (Zr 2+ , P 2+);

(Ga 2+ , Rb 3+); (Kr 1+ , S 2+); (Zr 2+ , Ag 2+);
(Ga 2+ , Eu 4+); (Kr 1+ , Br 2+); (Zr 2+ , I 2+);
(Ga 2+ , Tm 4+); (Kr 1+ , Xe 2+); (Zr 2+ , Cs 2+);
(Ge 1+ , Mg 2+); (Kr 1+ , Nd 3+); (Zr 2+ , La 3+);
(Ge 1+ , Mn 2+); (Kr 1+ , Pm 3+); (Zr 2+ , Au 2+);
(Ge 1+ , Tc 2+); (Kr 1+ , Tb 3+); (Zr 2+ , Hg 2+);
(Ge 1+ , Sn 2+); (Kr 2+ , Kr 3+); (Nb 2+ , C 2+);
(Ge 1+ , Pb 2+); (Kr 2+ , Tb 4+); (Nb 2+ , K 2+);
(Ge 2+ , F 2+); (Kr 3+ , O 3+); (Nb 2+ , Zr 3+);
(Ge 2+ , Na 2+); (Kr 3+ , Ni 4+); (Nb 2+ , Eu 3+);
(Ge 2+ , Se 3+); (Kr 3+ , Kr 4+); (Nb 2+ , Tm 3+);
(Ge 2+ , Pd 3+); (Kr 3+ , Nb 5+); (Nb 2+ , Lu 3+);
(Ge 2+ , I 3+); (Kr 4+ , Zr 5+); (Nb 3+ , Kr 3+);
(Ge 3+ , V 5+); (Kr 5+ , Sr 6+); (Nb 3+ , Pr 4+);
(Ge 3+ , Se 5+); (Kr 6+ , Y 7+); (Nb 3+ , Tb 4+);
(Ge 3+ , Pb 5+); (Rb 1+ , Nb 3+); (Nb 4+ , N 4+);
(As 1+ , Sc 2+); (Rb 2+ , Te 4+); (Mo 1+ , Ba 2+);
(As 1+ , Y 2+); (Rb 2+ , Sm 4+); (Mo 1+ , Pr 2+);
(As 1+ , Zr 2+); (Rb 2+ , Gd 4+); (Mo 1+ , Nd 2+);
(As 1+ , Lu 2+); (Rb 2+ , Dy 4+); (Mo 1+ , Ra 2+);
(As 2+ , Co 3+); (Rb 2+ , Ho 4+); (Mo 2+ , Ru 3+);
(As 2+ , Ga 3+); (Rb 2+ , Er 4+); (Mo 2+ , Sn 3+);
(As 2+ , Ge 3+); (Rb 3+ , Mg 3+); (Mo 3+ , Cr 4+);
(As 2+ , Tl 3+); (Rb 3+ , Te 5+); (Mo 3+ , Ge 4+);
(As 3+ , Fe 4+); (Rb 5+ , Rb 6+); (Mo 4+ , Bi 5+);
(As 4+ , Sb 6+); (Rb 6+ , Te 7+); (Mo 5+ , Mn 6+);
(Se 1+ , Al 2+); (Sr 1+ , Be 2+); (Mo 6+ , O 6+);
(Se 1+ , Si 2+); (Sr 1+ , Zn 2+); (Mo 6+ , Cr 7+);
(Tc 1+ , Sr 2+); (Sn 1+ , Er 2+); (Pr 2+ , Xe 2+);
(Tc 1+ , La 2+); (Sn 2+ , N 2+); (Pr 2+ , Pr 3+);
(Tc 1+ , Ce 2+); (Sn 2+ , Ar 2+); (Pr 2+ , Nd 3+);
(Tc 1+ , Pm 2+); (Sn 2+ , V 3+); (Pr 2+ , Pm 3+);
(Tc 1+ , Sm 2+); (Sn 2+ , Mo 3+); (Pr 2+ , Gd 3+);
(Tc 1+ , Eu 2+); (Sn 3+ , Mn 4+); (Pr 2+ , Tb 3+);
(Tc 1+ , Tb 2+); (Sn 3+ , Fe 4+); (Nd 2+ , Sm 3+);
(Tc 1+ , Dy 2+); (Sn 3+ , Co 4+); (Nd 2+ , Dy 3+);
(Ru 1+ , Ca 2+); (Sb 2+ , Ti 3+); (Nd 2+ , Ho 3+);
(Ru 1+ , Eu 2+); (Sb 2+ , Sb 3+); (Nd 2+ , Er 3+);
(Ru 1+ , Tb 2+); (Sb 2+ , Bi 3+); (Nd 2+ , Lu 3+);
(Ru 1+ , Dy 2+); (Sb 3+ , C 3+); (Pm 2+ , C 2+);
(Ru 1+ , Ho 2+); (Te 1+ , Sc 2+); (Pm 2+ , K 2+);
(Ru 1+ , Er 2+); (Te 1+ , Y 2+); (Pm 2+ , Zr 3+);
(Rh 1+ , V 2+); (Te 1+ , Gd 2+); (Pm 2+ , Eu 3+);
(Rh 1+ , Nb 2+); (Te 1+ , Tm 2+); (Pm 2+ , Tm 3+);
(Rh 1+ , Sn 2+); (Te 1+ , Yb 2+); (Sm 2+ , Cl 2+);
(Rh 1+ , Hf 2+); (Te 1+ , Lu 2+); (Sm 2+ , Sc 3+);
(Pd 1+ , Al 2+); (Te 2+ , Sc 3+); (Sm 2+ , Yb 3+);
(Pd 1+ , Si 2+); (Te 2+ , Kr 2+); (Eu 2+ , Nb 3+);
(Pd 1+ , Fe 2+); (Te 2+ , Yb 3+); (Gd 2+ , Cl 2+);

(Pd 1+ , Co 2+); (Te 2+ , Hf 3+); (Gd 2+ , Sc 3+);
(Pd 1+ , Ru 2+); (Te 3+ , Ar 3+); (Gd 2+ , Eu 3+);
(Pd 1+ , In 2+); (Te 3+ , La 4+); (Gd 2+ , Yb 3+);
(Pd 1+ , Sb 2+); (Te 3+ , Yb 4+); (Tb 2+ , B 2+);
(Pd 1+ , Bi 2+); (Te 4+ , Bi 5+); (Tb 2+ , S 2+);
(Ag 1+ , Cu 2+); (I 1+ , Al 2+); (Tb 2+ , Br 2+);
(Ag 1+ , As 2+); (I 1+ , Si 2+); (Tb 2+ , Xe 2+);
(Ag 1+ , Ag 2+); (I 1+ , Fe 2+); (Tb 2+ , Sm 3+);
(Ag 1+ , Cs 2+); (I 1+ , Co 2+); (Tb 2+ , Tb 3+);
(Ag 1+ , Hg 2+); (I 1+ , Ge 2+); (Tb 2+ , Dy 3+);
(Cd 1+ , Zn 2+); (I 1+ , Ru 2+); (Tb 2+ , Ho 3+);
(Cd 1+ , Ga 2+); (I 1+ , In 2+); (Tb 2+ , Er 3+);
(Cd 1+ , Cd 2+); (I 1+ , Bi 2+); (Dy 2+ , Cl 2+);
(Cd 1+ , Tl 2+); (Xe 1+ , Al 2+); (Dy 2+ , K 2+);
(In 1+ , Sc 2+); (Xe 1+ , Co 2+); (Dy 2+ , Zr 3+);
(In 1+ , Y 2+); (Xe 1+ , Ni 2+); (Dy 2+ , Eu 3+);
(In 1+ , Yb 2+); (Xe 1+ , Rh 2+); (Dy 2+ , Yb 3+);
(In 1+ , Lu 2+); (Xe 1+ , Cd 2+); (Ho 2+ , Sc 3+);
(In 2+ , Sr 3+); (Xe 1+ , Sb 2+); (Ho 2+ , Yb 3+);
(In 2+ , Cd 3+); (La 2+ , Ti 3+); (Ho 2+ , Hf 3+);
(Sn 1+ , Ca 2+); (La 2+ , Sb 3+); (Er 2+ , Sc 3+);
(Sn 1+ , Sr 2+); (Ce 2+ , Ag 2+); (Er 2+ , Yb 3+);
(Sn 1+ , La 2+); (Ce 2+ , I 2+); (Er 2+ , Hf 3+);
(Sn 1+ , Sm 2+); (Ce 2+ , Cs 2+); (Tm 2+ , Kr 2+);
(Sn 1+ , Eu 2+); (Ce 2+ , Au 2+); (Tm 2+ , Nb 3+);
(Sn 1+ , Tb 2+); (Ce 2+ , Hg 2+); (Tm 2+ , Hf 3+);
(Sn 1+ , Dy 2+); (Pr 2+ , B 2+); (Yb 2+ , Ti 3+);
(Sn 1+ , Ho 2+); (Pr 2+ , Y 3+); (Lu 2+ , Kr 2+);
(Lu 2+ , Hf 3+); (Pb 2+ , As 3+); (Tl 1+ , Mg 2+);
(Hf 2+ , As 2+); (Pb 2+ , In 3+); (Tl 1+ , Mn 2+);
(Hf 2+ , Ag 2+); (Pb 2+ , Te 3+); (Tl 1+ , Mo 2+);
(Hf 2+ , I 2+); (Pb 2+ , Pb 3+); (Tl 1+ , Tc 2+);
(Hf 2+ , Cs 2+); (Pb 3+ , Br 4+); (Tl 1+ , Sn 2+);
(Hf 2+ , Hg 2+); (Bi 1+ , Ba 2+); (Tl 1+ , Pb 2+);
(Hg 1+ , Al 2+); (Bi 2+ , Ar 2+); (Pb 1+ , Sc 2+);
(Hg 1+ , Si 2+); (Bi 2+ , Mo 3+); (Pb 1+ , Y 2+);
(Hg 1+ , Co 2+); (Bi 3+ , Se 4+); (Pb 1+ , Lu 2+); and
(Hg 1+ , Ni 2+); (Bi 3+ , Mo 4+); (Pb 2+ , Fe 3+).
(Hg 1+ , Rh 2+); (Bi 3+ , Pb 4+);
(Hg 1+ , Cd 2+); (Bi 4+ , P 5+);
(Hg 1+ , In 2+); (Bi 4+ , Kr 5+);
(Hg 1+ , Sb 2+); (Bi 4+ , Zr 5+);

64. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a single electron transfer from each of two species selected from the group consisting of atoms, ions, molecules, ionic compounds and

molecular compounds.

65. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises a two electron transfer from one species selected from the group consisting of atoms, ions, molecules, ionic compounds and molecular compounds.

66. (Previously Presented) A reactor according to claim 42, wherein said catalyst comprises at least one free atom selected from the group consisting of Be, Cu, Zn, Pd, Te and Pt.

67. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises three electron transfers between two species selected from the group consisting of atoms, ions, molecules, ionic compounds and molecular compounds.

68. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one salt selected from the group consisting of MoI_2, $TiCl_2$, $TiCl_4$, $SnCl_4$, $SiCl_4$, $PrBr_3$, $CaBr_2$, $SrCl_2$, CrI_2, TbI_3, $SbCl_3$, CrF_3, $CoCl_2$, $BiCl_3$, $NiCl_2$, PdF_2, InCl, $LaCl_3$, $DyCl_3$, LaI_3, HoI_3, KNO_3, VF_3, PbF_2, VOCl, PbI_2, $LuCl_3$, $PbCl_2$, AsI_3, HoI_3, $MoCl_5$, $SnCl_4$, SbI_3, CdI_2, AgF_2, AgF, LaI_3, ErI_3, VCl_4, BCl_3, $FeCl_3$, $TiCl_3$, CoI_2, CoF_2, TlI, TlF, $BiBr_3$, $ZnBr_2$, AsI_3, DyI_3, $HoCl_3$, $MgCl_2$, $CrCl_3$, $PrCl_3$, $SrCl_2$, $FeCl_2$, $NiCl_2$, CuCl, $SrCl_2$, $MoCl_2$, YCl_3, $ZrCl_4$, CdI_2, BaI_2, HoI_3, PbI_2, PdF_2, LiF, $EuCl_3$, $MgCl_2$, $ErCl_3$, $MgCl_2$, $ErCl_3$, $MgCl_2$, $BiCl_4$, $AlCl_3$, $CaBr_2$, $SmBr_3$, VaF_3, $LaCl_3$, GdI_3, CrI_2, MnI_2, $YbBr_3$, $FeBr_2$, $NiCl_2$, AgCl, $ZnCl_2$, $YbCl_2$, SeF_4, $SnCl_4$, SnF_4, SbI_3, BiI_2, EuF_3, and $PbCl_2$.

69. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one set of two species selected from the group consisting of:

(	Li	0+	,	Ar	5+	);	(	P	1+	,	Nd	4+	);	(	Ti	2+	,	As	5+	);
(	Li	0+	,	Mo	6+	);	(	P	1+	,	Tb	4+	);	(	Ti	2+	,	Se	5+	);
(	Be	0+	,	Kr	5+	);	(	P	3+	,	Na	5+	);	(	V	1+	,	Cd	3+	);
(	B	0+	,	Sc	3+	);	(	S	0+	,	Sm	3+	);	(	V	1+	,	I	3+	);
(	B	0+	,	Zr	3+	);	(	S	0+	,	Dy	3+	);	(	V	1+	,	Hg	3+	);
(	B	0+	,	Yb	3+	);	(	S	0+	,	Ho	3+	);	(	V	2+	,	Kr	4+	);
(	C	0+	,	Te	3+	);	(	S	0+	,	Er	3+	);	(	V	2+	,	Nb	5+	);
(	C	0+	,	Tl	3+	);	(	S	0+	,	Lu	3+	);	(	V	4+	,	Ni	7+	);
(	N	0+	,	Ag	3+	);	(	S	1+	,	Nb	4+	);	(	V	4+	,	Kr	8+	);
(	N	0+	,	Cd	3+	);	(	S	1+	,	Ho	4+	);	(	Cr	1+	,	S	3+	);
(	N	0+	,	Hg	3+	);	(	S	1+	,	Er	4+	);	(	Cr	1+	,	Ca	3+	);
(	N	1+	,	Bi	5+	);	(	S	1+	,	Tm	4+	);	(	Cr	3+	,	Be	3+	);
(	N	2+	,	Br	6+	);	(	S	2+	,	Bi	5+	);	(	Cr	3+	,	Zn	5+	);
(	N	2+	,	Kr	6+	);	(	Cl	0+	,	Ti	3+	);	(	Cr	5+	,	Cu	8+	);
(	O	0+	,	Cl	3+	);	(	Cl	1+	,	Mo	4+	);	(	Mn	1+	,	Nd	4+	);
(	O	0+	,	Kr	3+	);	(	Cl	1+	,	Pb	4+	);	(	Mn	1+	,	Tb	4+	);
(	O	0+	,	Sm	4+	);	(	Cl	3+	,	Sc	5+	);	(	Mn	2+	,	Ca	4+	);
(	O	0+	,	Dy	4+	);	(	Cl	4+	,	Br	7+	);	(	Mn	3+	,	Nb	6+	);
(	O	2+	,	Na	4+	);	(	Ar	0+	,	Mn	3+	);	(	Mn	5+	,	Ca	8+	);
(	O	2+	,	Cl	6+	);	(	Ar	0+	,	As	3+	);	(	Fe	1+	,	Nd	4+	);
(	O	2+	,	Mn	6+	);	(	Ar	0+	,	Rh	3+	);	(	Fe	1+	,	Pm	4+	);
(	O	3+	,	Al	5+	);	(	Ar	0+	,	Tl	3+	);	(	Fe	1+	,	Tb	4+	);
(	F	0+	,	Bi	4+	);	(	Ar	1+	,	Mn	4+	);	(	Fe	3+	,	Ne	4+	);
(	F	1+	,	Mn	5+	);	(	Ar	1+	,	In	4+	);	(	Fe	5+	,	Mo	8+	);
(	F	3+	,	Mg	5+	);	(	Ar	5+	,	Mg	5+	);	(	Co	1+	,	Pm	4+	);
(	F	4+	,	Ti	8+	);	(	K	0+	,	Al	3+	);	(	Co	2+	,	C	4+	);
(	Ne	1+	,	Ge	5+	);	(	K	0+	,	Cr	3+	);	(	Co	3+	,	Mg	4+	);
(	Ne	4+	,	Al	6+	);	(	K	0+	,	Pb	3+	);	(	Ni	1+	,	La	4+	);
(	Na	0+	,	Cr	4+	);	(	K	1+	,	Sc	4+	);	(	Ni	1+	,	Yb	4+	);
(	Na	0+	,	Ge	4+	);	(	K	2+	,	Cl	5+	);	(	Ni	1+	,	Lu	4+	);
(	Na	1+	,	Sc	5+	);	(	Ca	0+	,	Eu	3+	);	(	Ni	2+	,	K	4+	);
(	Na	1+	,	Bi	6+	);	(	Ca	0+	,	Dy	3+	);	(	Ni	5+	,	Fe	8+	);
(	Na	3+	,	Ne	6+	);	(	Ca	0+	,	Ho	3+	);	(	Cu	0+	,	Ce	3+	);
(	Na	4+	,	Ne	7+	);	(	Ca	0+	,	Er	3+	);	(	Cu	0+	,	Pr	3+	);
(	Mg	0+	,	Kr	3+	);	(	Ca	1+	,	Mg	3+	);	(	Cu	1+	,	Ar	3+	);
(	Mg	2+	,	Al	5+	);	(	Ca	1+	,	Fe	4+	);	(	Cu	1+	,	Ti	4+	);
(	Mg	3+	,	Na	6+	);	(	Ca	1+	,	Co	4+	);	(	Cu	1+	,	Te	4+	);
(	Al	1+	,	Zr	5+	);	(	Ca	3+	,	Co	6+	);	(	Cu	2+	,	Sn	5+	);
(	Al	3+	,	Mg	6+	);	(	Ca	3+	,	Y	6+	);	(	Zn	0+	,	Y	3+	);
(	Al	3+	,	Cr	8+	);	(	Sc	1+	,	C	3+	);	(	Zn	0+	,	Pm	3+	);
(	Si	1+	,	Zn	3+	);	(	Sc	1+	,	Te	4+	);	(	Zn	0+	,	Gd	3+	);
(	Si	1+	,	Ce	4+	);	(	Ti	1+	,	Mn	3+	);	(	Zn	0+	,	Tb	3+	);
(	Si	2+	,	Na	4+	);	(	Ti	1+	,	Ga	3+	);	(	Zn	1+	,	Mo	4+	);
(	Si	2+	,	Cl	6+	);	(	Ti	1+	,	As	3+	);	(	Zn	1+	,	Pb	4+	);

(Si 3+ , Be 4+); (Ti 1+ , Rh 3+); (Zn 2+ , N 4+);
(Si 5+ , N 6+); (Ti 1+ , Tl 3+); (Zn 2+ , Kr 5+);
(Zn 3+ , N 5+); (Y 5+ , Co' 7+); (Ce 1+ , Ho 3+);
(Zn 5+ , Co 8+); (Zr 1+ , Zr 3+); (Ce 1+ , Er 3+);
(Ga 1+ , Bi 4+); (Zr 2+ , Sc 4+); (Ce 1+ , Lu 3+);
(Ge 1+ , S 3+); (Zr 2+ , Sr 4+); (Pr 1+ , Sc 3+);
(Ge 1+ , Ce 4+); (Nb 1+ , Mo 3+); (Pr 1+ , Zr 3+);
(As 1+ , Ca 3+); (Nb 1+ , Sb 3+); (Pr 1+ , Yb 3+);
(As 1+ , Br 3+); (Nb 1+ , Bi 3+); (Nd 1+ , Nb 3+);
(As 2+ , F 3+); (Nb 2+ , Sn 4+); (Nd 1+ , Hf 3+);
(As 2+ , Kr 4+); (Nb 2+ , Sb 4+); (Pm 1+ , Nb 3+);
(As 2+ , Nb 5+); (Nb 3+ , Co 5+); (Sm 1+ , Ti 3+);
(Se 1+ , Zn 3+); (Nb 3+ , Rb 5+); (Eu 1+ , V 3+);
(Se 1+ , Ce 4+); (Nb 4+ , Zn 6+); (Eu 1+ , Mo 3+);
(Se 2+ , Kr 4+); (Mo 1+ , Se 3+); (Eu 1+ , Sb 3+);
(Se 2+ , Nb 5+); (Mo 1+ , I 3+); (Gd 1+ , Bi 3+);
(Se 3+ , Ni 5+); (Mo 4+ , Fe 6+); (Tb 1+ , Hf 3+);
(Se 4+ , Nb 7+); (Mo 5+ , Rb 8+); (Dy 1+ , Ti 3+);
(Br 0+ , Eu 3+); (Ag 0+ , La 3+); (Ho 1+ , Bi 3+);
(Br 0+ , Tm 3+); (Ag 0+ , Ce 3+); (Er 1+ , Bi 3+);
(Br 1+ , Nb 4+); (Cd 0+ , La 3+); (Tm 1+ , V 3+);
(Br 1+ , Gd 4+); (In 1+ , Nd 4+); (Tm 1+ , Mo 3+);
(Br 1+ , Ho 4+); (In 1+ , Tb 4+); (Tm 1+ , Sb 3+);
(Br 1+ , Er 4+); (Sn 1+ , Si 3+); (Yb 1+ , Al 3+);
(Br 2+ , F 3+); (Sn 1+ , Co 3+); (Yb 1+ , Ru 3+);
(Br 2+ , Ga 4+); (Sn 1+ , Ge 3+); (Yb 1+ , In 3+);
(Br 3+ , O 4+); (Sn 2+ , F 3+); (Yb 1+ , Sn 3+);
(Br 3+ , Al 4+); (Sn 2+ , Ga 4+); (Lu 1+ , Tc 3+);
(Br 4+ , N 5+); (Sb 1+ , Si 3+); (Lu 1+ , Ru 3+);
(Kr 0+ , Ti 3+); (Sb 1+ , Co 3+); (Lu 1+ , In 3+);
(Kr 1+ , Sn 4+); (Sb 1+ , Ge 3+); (Lu 1+ , Sn 3+);
(Kr 1+ , Sb 4+); (Sb 2+ , As 4+); (Hf 1+ , Sc 3+);
(Kr 2+ , Ne 3+); (Te 1+ , Mn 3+); (Hf 1+ , Yb 3+);
(Kr 2+ , Bi 5+); (Te 1+ , As 3+); (Hg 0+ , La 3+);
(Kr 3+ , O 4+); (Te 1+ , Rh 3+); (Pb 1+ , Ni 3+);
(Kr 3+ , Al 4+); (Te 1+ , Te 3+); (Pb 1+ , Se 3+);
(Kr 4+ , Ar 6+); (Te 1+ , Tl 3+); (Pb 2+ , F 3+);
(Rb 0+ , Sc 3+); (Te 2+ , Cr 4+); (Pb 2+ , Ga 4+);
(Rb 0+ , Zr 3+); (Te 2+ , Ge 4+); (Bi 1+ , P 3+);
(Rb 0+ , Yb 3+); (Te 2+ , As 4+); (Bi 1+ , Sr 3+);
(Rb 1+ , N 3+); (Te 3+ , Zr 5+); (La 1+ , Ru 3+);
(Sr 1+ , C 3+); (Te 4+ , Ni 6+); (La 1+ , In 3+);
(Sr 1+ , Ar 3+); (Te 4+ , Cu 6+); (La 1+ , Sn 3+);
(Sr 1+ , Ti 4+); (Xe 0+ , Pr 3+); (Ce 1+ , Sm 3+); and
(Sr 1+ , Te 4+); (Xe 0+ , Nd 3+); (Ce 1+ , Dy 3+).
(Sr 3+ , Nb 6+); (La 1+ , Tc 3+);

70. (Previously Presented) A reactor according to claim 42, wherein said source of

catalyst comprises a plurality of electron ionizations or electron transfers from at least one selected from the group consisting of atoms, ions, molecules, ionic compounds and molecular compounds.

71. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one selected from the group consisting of:

(Ne 1 + , H 1 +); (Kr 3 + , B 2 +); (Tm 3 + , N 1 +);
(Ar 2 + , H 1 +); (Rb 3 + , B 2 +); (Pb 3 + , N 1 +);
(Sn 3 + , H 1 +); (B 2 + , P 1 +); (Sr 3 + , N 2 +);
(Pm 3 + , H 1 +); (P 4 + , B 3 +); (N 2 + , P 2 +);
(Sm 3 + , H 1 +); (B 2 + , S 1 +); (Ar 4 + , N 3 +);
(Dy 3 + , H 1 +); (V 4 + , B 3 +); (Fe 4 + , N 3 +);
(Kr 3 + , He 1 +); (B 2 + , As 1 +); (Ni 4 + , N 3 +);
(Rb 3 + , He 1 +); (B 2 + , Se 1 +); (N 2 + , Cu 2 +);
(K 4 + , He 2 +); (B 2 + , I 1 +); (N 2 + , Pd 2 +);
(Zn 4 + , He 2 +); (B 2 + , Ba 2 +); (N 2 + , I 2 +);
(Se 5 + , He 2 +); (B 2 + , Ce 2 +); (N 2 + , La 3 +);
(He 1 + , Rb 2 +); (B 2 + , Pr 2 +); (N 2 + , Ce 3 +);
(Zr 4 + , He 2 +); (B 2 + , Nd 2 +); (N 2 + , Tl 2 +);
(He 1 + , Mo 3 +); (B 2 + , Pm 2 +); (N 3 + , Cr 4 +);
(Si 2 + , Li 1 +); (B 2 + , Hg 1 +); (N 3 + , As 4 +);
(Mn 2 + , Li 1 +); (B 2 + , Rn 1 +); (N 3 + , La 4 +);
(Co 2 + , Li 1 +); (B 2 + , Ra 2 +); (Ne 4 + , N 5 +);
(Pd 2 + , Li 1 +); (Cl 2 + , C 1 +); (Fe 6 + , N 5 +);
(I 2 + , Li 1 +); (Zn 2 + , C 1 +); (Kr 7 + , N 5 +);
(Hf 3 + , Li 1 +); (Nb 3 + , C 1 +); (Nb 6 + , N 5 +);
(Li 1 + , C 3 +); (Pr 3 + , C 1 +); (N 4 + , Te 6 +);
(Li 1 + , N 3 +); (Kr 3 + , C 2 +); (Ne 1 + , O 1 +);
(Li 1 + , Na 2 +); (Rb 3 + , C 2 +); (Ar 2 + , O 1 +);
(Li 1 + , S 4 +); (C 2 + , P 2 +); (Sn 3 + , O 1 +);
(Cu 5 + , Li 2 +); (Ar 4 + , C 3 +); (Pm 3 + , O 1 +);
(Li 1 + , Br 4 +); (Fe 4 + , C 3 +); (Sm 3 + , O 1 +);
(Br 6 + , Li 2 +); (Ni 4 + , C 3 +); (Dy 3 + , O 1 +);
(V 6 + , Li 3 +); (C 2 + , Cu 2 +); (F 2 + , O 2 +);
(Li 2 + , Mn 6 +); (C 2 + , Ga 2 +); (Ne 2 + , O 2 +);
(Cu 2 + , Be 1 +); (C 2 + , Y 3 +); (O 1 + , Mg 1 +);
(Kr 2 + , Be 1 +); (C 2 + , Pd 2 +); (O 1 + , Ti 1 +);
(Cd 2 + , Be 1 +); (C 2 + , Ce 3 +); (O 1 + , V 1 +);
(Te 3 + , Be 1 +); (C 2 + , Gd 3 +); (O 1 + , Cr 1 +);
(Ce 3 + , Be 1 +); (C 2 + , Au 2 +); (O 1 + , Mn 1 +);
(K 2 + , Be 2 +); (C 2 + , Tl 2 +); (O 1 + , Fe 1 +);
(V 3 + , Be 2 +); (Sc 4 + , C 4 +); (O 1 + , Co 1 +);
(Ge 3 + , Be 2 +); (C 3 + , Cu 3 +); (O 1 + , Ni 1 +);
(Mo 3 + , Be 2 +); (C 3 + , Br 3 +); (O 1 + , Cu 1 +);
(Bi 3 + , Be 2 +); (C 3 + , Kr 3 +); (O 1 + , Ge 1 +);

(Be 2 + , Ne 5 +); (C 3 + , Cd 3 +); (O 1 + , Zr 1 +);
(Be 2 + , Kr 8 +); (C 3 + , Te 4 +); (O 1 + , Nb 1 +);
(Be 2 + , Mo 7 +); (C 3 + , Ce 4 +); (O 1 + , Mo 1 +);
(Be 3 + , Al 6 +); (Se 3 + , N 1 +); (O 1 + , Tc 1 +);
(Br 2 + , B 1 +); (Eu 3 + , N 1 +); (O 1 + , Ru 1 +);
(Ce 3 + , B 1 +); (Ho 3 + , N 1 +); (O 1 + , Rh 1 +);
(Cl 3 + , B 2 +); (Er 3 + , N 1 +); (O 1 + , Ag 1 +);
(O 1 + , Sn 1 +); (Ar 5 + , F 3 +); (Hf 3 + , Na 1 +);
(O 1 + , Ta 1 +); (Cr 5 + , F 3 +); (Na 1 + , Al 2 +);
(O 1 + , W 1 +); (F 2 + , Ni 3 +); (Na 1 + , P 2 +);
(O 1 + , Re 1 +); (F 2 + , Ge 3 +); (Ar 4 + , Na 2 +);
(O 1 + , Pb 1 +); (Sr 5 + , F 3 +); (Fe 4 + , Na 2 +);
(O 1 + , Bi 1 +); (F 2 + , Zr 4 +); (Ni 4 + , Na 2 +);
(O 2 + , Ar 2 +); (F 2 + , Ag 3 +); (Na 1 + , Pd 2 +);
(K 4 + , O 3 +); (F 4 + , F 4 +); (Na 1 + , In 2 +);
(O 2 + , Ti 3 +); (Cl 6 + , F 4 +); (Na 1 + , I 2 +);
(Zn 4 + , O 3 +); (F 3 + , Ar 4 +); (Na 1 + , La 3 +);
(O 2 + , Rb 2 +); (F 3 + , Zn 4 +); (Na 1 + , Ce 3 +);
(O 2 + , Mo 3 +); (F 3 + , Br 5 +); (Na 3 + , Na 3 +);
(O 3 + , Cr 4 +); (F 3 + , Te 5 +); (K 5 + , Na 3 +);
(O 3 + , As 4 +); (F 4 + , F 4 +); (Na 2 + , Ti 4 +);
(O 3 + , La 4 +); (Mg 4 + , F 5 +); (Ti 4 + , Na 3 +);
(Mg 4 + , O 5 +); (F 6 + , F 6 +); (Fe 5 + , Na 3 +);
(O 5 + , Sc 6 +); (Cr 7 + , F 6 +); (Rb 6 + , Na 3 +);
(Cu 7 + , O 6 +); (F 5 + , Co 7 +); (Na 2 + , Sr 3 +);
(O 5 + , Kr 7 +); (F 5 + , Y 8 +); (Na 2 + , Sb 4 +);
(Si 3 + , F 1 +); (F 6 + , F 6 +); (Na 2 + , Gd 4 +);
(K 2 + , F 1 +); (F 6 + , Ne 6 +); (Na 2 + , Yb 4 +);
(Ge 3 + , F 1 +); (F 6 + , Co 8 +); (Na 3 + , Na 3 +);
(Lu 3 + , F 1 +); (Cr 3 + , Ne 1 +); (Kr 7 + , Na 4 +);
(Bi 3 + , F 1 +); (La 3 + , Ne 1 +); (Na 3 + , Rb 5 +);
(F 2 + , F 2 +); (Ne 1 + , Cl 1 +); (Na 3 + , Sr 5 +);
(Ne 2 + , F 2 +); (Ne 1 + , Sc 2 +); (Mo 6 + , Na 4 +);
(F 1 + , Mg 1 +); (Ne 1 + , Ti 2 +); (Na 3 + , Te 6 +);
(F 1 + , Sc 1 +); (Cr 4 + , Ne 2 +); (Si 4 + , Na 5 +);
(F 1 + , Ti 1 +); (Se 4 + , Ne 2 +); (Na 4 + , Sc 6 +);
(F 1 + , V 1 +); (Ne 1 + , Zr 2 +); (Cu 7 + , Na 5 +);
(F 1 + , Cr 1 +); (Mo 5 + , Ne 2 +); (Na 4 + , Kr 7 +);
(F 1 + , Mn 1 +); (Ne 1 + , Lu 2 +); (S 2 + , Mg 1 +);
(F 1 + , Fe 1 +); (Pb 4 + , Ne 2 +); (Ni 2 + , Mg 1 +);
(F 1 + , Co 1 +); (Ar 5 + , Ne 3 +); (Br 2 + , Mg 1 +);
(F 1 + , Ni 1 +); (Sc 4 + , Ne 3 +); (Ag 2 + , Mg 1 +);
(F 1 + , Cu 1 +); (Cr 5 + , Ne 3 +); (Ti 3 + , Mg 2 +);
(F 1 + , Ge 1 +); (Ne 2 + , Ni 3 +); (Se 3 + , Mg 2 +);
(F 1 + , Zr 1 +); (Ne 2 + , Br 3 +); (Eu 3 + , Mg 2 +);
(F 1 + , Nb 1 +); (Sr 5 + , Ne 3 +); (Ho 3 + , Mg 2 +);
(F 1 + , Mo 1 +); (Ar 6 + , Ne 4 +); (Er 3 + , Mg 2 +);
(F 1 + , Tc 1 +); (Ne 3 + , Cr 5 +); (Tm 3 + , Mg 2 +);
(F 1 + , Ru 1 +); (Fe 6 + , Ne 4 +); (Pb 3 + , Mg 2 +);

(F 1 + , Rh 1 +);
(F 1 + , Ag 1 +);
(F 1 + , Sn 1);
(F 1 + , Hf 1 +);
(F 1 + , Ta 1 +);
(F 1 + , Re 1 +);
(F 1 + , Pb 1 +);
(F 1 + , Bi 1 +);
(F 2 + , F 2 +);
(F 2 + , S 3 +);
(Mg 5 + , Sc 8 +);
(Mg 6 + , Mn 8 +);
(Si 2 + , Al 1 +);
(Mn 2 + , Al 1 +);
(Co 2 + , Al 1 +);
(Ge 2 + , Al 1 +);
(Zr 3 + , Al 1 +);
(I 2 + , Al 1 +);
(Hf 3 + , Al 1 +);
(Hg 2 + , Al 1 +);
(S 3 + , Al 2 +);
(V 3 + , Al 2 +);
(Br 3 + , Al 2 +);
(Mo 3 + , Al 2 +);
(Sb 4 + , Al 3 +);
(Bi 4 + , Al 3 +);
(Ca 7 + , Al 4 +);
(Al 3 + , Sc 5 +);
(Al 4 + , Kr 8 +);
(Al 5 + , Ni 8 +);
(Ni 2 + , Si 1 +);
(Br 2 + , Si 1 +);
(Sr 2 + , Si 2 +);
(Sb 3 + , Si 2 +);
(Gd 3 + , Si 2 +);
(Yb 3 + , Si 2 +);
(K 3 + , Si 3 +);
(Si 2 + , Ca 1 +);
(Si 2 + , Ga 1 +);
(Si 2 + , Sr 1 +);
(Si 2 + , Y 1 +);
(Y 3 + , Si 3 +);
(Mo 4 + , Si 3 +);
(Si 2 + , In 1 +);
(Si 2 + , Ba 1 +);
(Si 2 + , La 1 +);
(Si 2 + , Ce 1 +);
(Si 2 + , Pr 1 +);
(Si 2 + , Nd 1 +);

(Nb 6 + , Ne 4 +);
(Ne 3 + , Pb 5 +);
(Ne 4 + , Na 4 +);
(Al 4 + , Ne 5 +);
(Ne 4 + , Fe 6 +);
(Ne 4 + , Rb 7 +);
(Si 2 + , Na 1 +);
(Co 2 + , Na 1 +);
(Pd 2 + , Na 1 +);
(I 2 + , Na 1 +);
(Si 2 + , Ac 1 +);
(Si 2 + , Th 1 +);
(Si 2 + , Pa 1 +);
(Si 2 + , U 1 +);
(Si 2 + , Np 1 +);
(Si 2 + , Pu 1 +);
(Si 2 + , Am 1 +);
(Si 2 + , Cm 1 +);
(Si 2 + , Bk 1 +);
(Si 2 + , Cf 1 +);
(Si 2 + , Es 1 +);
(S 4 + , Si 4 +);
(Sc 3 + , Si 4 +);
(Mn 4 + , Si 4 +);
(Si 3 + , Co 2 +);
(Si 3 + , Zn 2 +);
(Si 3 + , Ru 2 +);
(Si 3 + , Rh 2 +);
(Si 3 + , Cd 2 +);
(Sn 4 + , Si 4 +);
(Si 3 + , Bi 2 +);
(Si 4 + , Cu 7 +);
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(Pr 3 + , P 1 +);
(S 3 + , P 2 +);
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(P 3 + , S 2 +);
(P 3 + , Cl 2 +);
(Co 4 + , P 4 +);
(P 3 + , Kr 2 +);
(Kr 5 + , P 4 +);
(P 3 + , Zr 3 +);
(P 3 + , Sm 3 +);
(P 3 + , Tm 3 +);
(P 3 + , Hf 3 +);
(P 4 + , Cu 3 +);
(Ge 4 + , P 5 +);
(P 4 + , Kr 3 +);
(Y 5 + , P 5 +);

(Ni 5 + , Mg 3 +);
(Zn 5 + , Mg 3 +);
(Mg 2 + , Kr 4 +);
(Mg 2 + , Rb 4 +);
(Sb 5 + , Mg 3 +);
(Mg 3 + , Se 6 +);
(Mg 3 + , Zr 5 +);
(Te 6 + , Mg 4 +);
(Mg 4 + , Cl 7 +);
(Ti 7 + , Mg 5 +);
(S 2 + , Ti 1 +);
(S 2 + , V 1 +);
(S 2 + , Cr 1 +);
(S 2 + , Mn 1 +);
(S 2 + , Ni 1 +);
(S 2 + , Cu 1 +);
(S 2 + , Y 1 +);
(S 2 + , Zr 1 +);
(S 2 + , Nb 1 +);
(S 2 + , Mo 1 +);
(S 2 + , Tc 1 +);
(S 2 + , Ru 1 +);
(S 2 + , Rh 1 +);
(S 2 + , Ag 1 +);
(S 2 + , Sn 1 +);
(S 2 + , Hf 1 +);
(S 2 + , Pb 1 +);
(S 2 + , Bi 1 +);
(S 2 + , Es 1 +);
(Ar 4 + , S 4 +);
(Fe 4 + , S 4 +);
(Ni 4 + , S 4 +);
(S 3 + , Cu 2 +);
(S 3 + , Pd 2 +);
(S 3 + , In 2 +);
(S 3 + , I 2 +);
(S 3 + , La 3 +);
(S 3 + , Ce 3 +);
(K 5 + , S 5 +);
(S 4 + , Sb 4 +);
(S 4 + , Lu 4 +);
(S 4 + , Bi 4 +);
(S 5 + , Ar 4 +);
(S 5 + , K 4 +);
(S 5 + , Br 5 +);
(Y 6 + , S 6 +);
(Ar 2 + , Cl 1 +);
(Rb 2 + , Cl 1 +);
(Sn 3 + , Cl 1 +);

(Si 2 + , Pm 1 +); (P 4 + , Cd 3 +); (Nd 3 + , Cl 1 +);
(Si 2 + , Sm 1 +); (P 4 + , Te 4 +); (Pm 3 + , Cl 1 +);
(Si 2 + , Eu 1 +); (P 4 + , Ce 4 +); (Sm 3 + , Cl 1 +);
(Si 2 + , Gd 1 +); (P 5 + , Br 8 +); (Ca 2 + , Cl 2 +);
(Si 2 + , Tb 1 +); (P 7 + , S 7 +); (Mn 3 + , Cl 2 +);
(Si 2 + , Dy 1 +); (Nb 3 + , S 1 +); (Co 3 + , Cl 2 +);
(Si 2 + , Ho 1 +); (Cd 2 + , S 1 +); (Cl 4 + , Cl 3 +);
(Si 2 + , Er 1 +); (Te 3 + , S 1 +); (Cl 2 + , Ca 2 +);
(Si 2 + , Tm 1 +); (Ca 2 + , S 2 +); (Ca 3 + , Cl 3 +);
(Si 2 + , Yb 1 +); (Mn 3 + , S 2 +); (Cl 2 + , Br 1 +);
(Si 2 + , Lu 1 +); (Co 3 + , S 2 +); (Cl 2 + , Y 2 +);
(Si 2 + , Tl 1 +); (Nb 4 + , S 2 +); (Mo 5 + , Cl 3 +);
(Si 2 + , Ra 1 +); (S 2 + , Sc 1 +); (Cl 2 + , Xe 1 +);
(Cl 2 + , Eu 2 +); (Br 6 + , Ar 5 +); (Pr 3 + , Ca 2 +);
(Cl 2 + , Gd 2 +); (Nb 5 + , Ar 5 +); (Tb 3 + , Ca 2 +);
(Cl 2 + , Tb 2 +); (Ti 5 + , Ar 6 +); (Kr 5 + , Ca 3 +);
(Cl 2 + , Dy 2 +); (Mn 6 + , Ar 6 +); (Ca 2 + , Zr 3 +);
(Cl 2 + , Ho 2 +); (Ar 5 + , Ga 4 +); (Ca 2 + , Sm 3 +);
(Cl 2 + , Er 2 +); (Ar 5 + , As 5 +); (Ca 2 + , Dy 3 +);
(Cl 2 + , Tm 2 +); (Ar 7 + , Y 7 +); (Ca 2 + , Ho 3 +);
(Cl 2 + , Yb 2 +); (K 1 + , K 1 +); (Ca 2 + , Er 3 +);
(Se 5 + , Cl 4 +); (Xe 2 + , K 1 +); (Ca 2 + , Tm 3 +);
(Zr 4 + , Cl 4 +); (Pb 2 + , K 1 +); (Ca 2 + , Hf 3 +);
(Cl 3 + , Nb 3 +); (K 1 + , K 1 +); (Mn 5 + , Ca 4 +);
(Cl 3 + , Sb 3 +); (Zn 3 + , K 2 +); (Ca 3 + , Zn 3 +);
(Cl 3 + , Cs 2 +); (Br 4 + , K 2 +); (Ca 3 + , Rb 3 +);
(Cl 3 + , Yb 3 +); (K 1 + , Rb 1 +); (Ca 3 + , Pr 4 +);
(Cl 3 + , Bi 3 +); (Te 4 + , K 2 +); (Ca 3 + , Tb 4 +);
(Cl 4 + , Cl 3 +); (K 1 + , Cs 1 +); (Ca 4 + , Sr 4 +);
(Cl 4 + , Ar 3 +); (Sc 3 + , K 3 +); (Ca 4 + , Sb 5 +);
(Mn 5 + , Cl 5 +); (K 2 + , Ni 2 +); (Ca 4 + , Bi 5 +);
(Cl 4 + , Zn 3 +); (K 2 + , Zn 2 +); (Ca 5 + , Se 6 +);
(Cl 4 + , Rb 3 +); (K 2 + , As 2 +); (Rb 7 + , Ca 6 +);
(Cl 4 + , Sn 4 +); (K 2 + , Rh 2 +); (Ca 5 + , Zr 5 +);
(Cl 4 + , Nd 4 +); (K 2 + , Te 2 +); (Te 6 + , Ca 6 +);
(Cl 4 + , Tb 4 +); (K 2 + , Pt 2 +); (Ca 6 + , Ti 5 +);
(Ar 6 + , Cl 6 +); (K 3 + , Mn 3 +); (Se 6 + , Ca 7 +);
(Cl 5 + , Cr 5 +); (K 3 + , Co 3 +); (Ca 7 + , Ti 6 +);
(Fe 6 + , Cl 6 +); (Br 5 + , K 4 +); (Ca 7 + , Mn 7 +);
(Nb 6 + , Cl 6 +); (K 3 + , Pd 3 +); (Mn 2 + , Sc 1 +);
(Cl 5 + , Pb 5 +); (K 3 + , I 3 +); (Ge 2 + , Sc 1 +);
(Ti 3 + , Ar 1 +); (K 3 + , Hf 4 +); (Zr 3 + , Sc 1 +);
(Se 3 + , Ar 1 +); (Bi 5 + , K 4 +); (Ag 2 + , Sc 1 +);
(Sr 2 + , Ar 1 +); (Sc 5 + , K 5 +); (Hg 2 + , Sc 1 +);
(Sb 3 + , Ar 1 +); (K 4 + , Fe 4 +); (Rb 2 + , Sc 2 +);
(Gd 3 + , Ar 1 +); (K 4 + , Ni 4 +); (Sn 3 + , Sc 2 +);
(Yb 3 + , Ar 1 +); (K 4 + , Cu 4 +); (Nd 3 + , Sc 2 +);
(Fe 3 + , Ar 2 +); (Kr 6 + , K 5 +); (Pm 3 + , Sc 2 +);
(Ni 3 + , Ar 2 +); (Ca 6 + , K 6 +); (Kr 3 + , Sc 3 +);

(Cu 3 + , Ar 2 +);
(Sb 4 + , Ar 2 +);
(Bi 4 + , Ar 2 +);
(Ar 2 + , Sc 2 +);
(Ar 2 + , Ti 2 +);
(Se 4 + , Ar 3 +);
(Ar 2 + , Zr 2 +);
(Mo 5 + , Ar 3 +);
(Pb 4 + , Ar 3 +);
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(Ar 3 + , Xe 3 +);
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(Ar 4 + , V 4 +);
(Cu 5 + , Ar 5 +);
(Ar 4 + , Br 4 +);
(Sn 3 + , Ti 2 +);
(Pm 3 + , Ti 2 +);
(Sm 3 + , Ti 2 +);
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(Ti 3 + , Mn 2 +);
(Ti 3 + , Fe 2 +);
(Ti 3 + , Ge 2 +);
(Rb 4 + , Ti 4 +);
(Sr 4 + , Ti 4 +);
(Ti 3 + , Mo 2 +);
(Ti 3 + , Tc 2 +);
(Te 5 + , Ti 4 +);
(Ti 3 + , Hf 2 +);
(Ti 3 + , Pb 2 +);
(As 5 + , Ti 5 +);
(Ti 4 + , Rb 5 +);
(Ti 4 + , Sr 5 +);
(Mo 6 + , Ti 5 +);
(Ti 7 + , Ti 7 +);
(Ti 7 + , Ti 7 +);
(Mn 7 + , Ti 8 +);
(Ni 2 + , V 1 +);
(Ge 2 + , V 1 +);
(Zr 3 + , V 1 +);
(Ag 2 + , V 1 +);
(Hg 2 + , V 1 +);
(Se 3 + , V 2 +);
(Eu 3 + , V 2 +);
(Ho 3 + , V 2 +);
(Er 3 + , V 2 +);
(V 5 + , K 6 +);
(K 5 + , Mn 5 +);
(As 5 + , K 6 +);
(K 5 + , Sr 5 +);
(K 5 + , Sn 5 +);
(K 7 + , Ca 7 +);
(K 7 + , As 6 +);
(K 7 + , Mo 7 +);
(Mn 2 + , Ca 1 +);
(Co 2 , Ca 1 +);
(Ge 2 + , Ca 1 +);
(Zr 3 + , Ca 1 +);
(Hf 3 + , Ca 1 +);
(Hg 2 + , Ca 1 +);
(Zn 2 + , Ca 2 +);
(Rb 2 + , Ca 2 +);
(Se 6 + , V 6 +);
(V 6 + , Sr 8 +);
(Ni 2 + , Cr 1 +);
(Ge 2 + , Cr 1 +);
(Zr 3 + , Cr 1 +);
(Ag 2 + , Cr 1 +);
(Hg 2 + , Cr 1 +);
(Sr 2 + , Cr 2 +);
(Sb 3 + , Cr 2 +);
(Gd 3 + , Cr 2 +);
(Yb 3 + , Cr 2 +);
(Zn 3 + , Cr 3 +);
(Te 4 + , Cr 3 +);
(Cr 2 + , Cs 1 +);
(Cr 3 + , Se 2 +);
(Cr 3 + , Br 2 +);
(Y 4 + , Cr 4 +);
(Cr 3 + , Ag 2 +);
(Cr 3 + , Xe 2 +);
(Cr 3 + , Pr 3 +);
(Cr 3 + , Gd 3 +);
(Cr 3 + , Tb 3 +);
(Cr 3 + , Lu 3 +);
(Cr 4 + , Pm 4 +);
(Cr 4 + , Sm 4 +);
(Cr 4 + , Dy 4 +);
(Cr 6 + , Ni 7 +);
(Cr 6 + , Zn 7 +);
(Cr 7 + , Co 8 +);
(Ni 2 + , Mn 1 +);
(Ag 2 + , Mn 1 +);
(Se 3 + , Mn 2 +);
(Sr 2 + , Mn 2 +);
(Rb 3 + , Sc 3 +);
(Sc 3 + , Ge 4 +);
(Sc 3 + , Mo 4 +);
(Sc 3 + , Lu 4 +);
(Sc 3 + , Bi 4 +);
(Ti 5 + , Sc 5 +);
(Mn 6 + , Sc 5 +);
(Sc 4 + , Ga 4 +);
(Sc 4 + , As 5 +);
(Cu 6 + , Sc 6 +);
(Cu 7 + , Sc 7 +);
(Ni 2 + , Ti 1 +);
(Ge 2 + , Ti 1 +);
(Zr 3 + , Ti 1 +);
(Ag 2 + , Ti 1 +);
(Hg 2 + , Ti 1 +);
(Mn 2 + , Dy 1 +);
(Mn 2 + , Ho 1 +);
(Mn 2 + , Er 1 +);
(Mn 2 + , Tm 1 +);
(Mn 2 + , Yb 1 +);
(Mn 2 + , Lu 1 +);
(Mn 2 + , Hf 1 +);
(Mn 2 + , Tl 1 +);
(Mn 2 + , Ra 1 +);
(Mn 2 + , Ac 1 +);
(Mn 2 + , Th 1 +);
(Mn 2 + , Pa 1 +);
(Mn 2 + , U 1 +);
(Mn 2 + , Np 1 +);
(Mn 2 + , Pu 1 +);
(Mn 2 + , Am 1 +);
(Mn 2 + , Cm 1 +);
(Mn 2 + , Bk 1 +);
(Mn 2 + , Cf 1 +);
(Mn 2 + , Es 1 +);
(Co 4 + , Mn 4 +);
(Kr 5 + , Mn 4 +);
(Mn 3 + , Zr 3 +);
(Mn 3 + , Sm 3 +);
(Mn 3 + , Dy 3 +);
(Mn 3 + , Ho 3 +);
(Mn 3 + , Er 3 +);
(Mn 3 + , Tm 3 +);
(Mn 3 + , Hf 3 +);
(Mn 4 + , Sb 4 +);
(Mn 4 + , Gd 4 +);
(Mn 4 + , Lu 4 +);
(Mn 4 + , Bi 4 +);

(Tm 3 + , V 2 +); (Pb 3 + , V 2 +); (Sr 3 + , V 3 +); (Fe 4 + , V 4 +); (V 3 + , As 2 +); (V 3 + , Pd 2 +); (V 3 + , In 2 +); (V 3 + , Te 2 +); (V 3 + , I 2 +); (V 3 + , La 3 +); (V 3 + , Pt 2 +); (V 3 + , Hg 2 +); (V 4 + , Cu 3 +); (Ge 4 + , V 5 +); (V 4 + , Kr 3 +); (Y 5 + , V 5 +); (V 4 + , Cd 3 +); (V 4 + , Te 4 +); (V 4 + , Ce 4 +); (Fe 5 + , Te 6 +); (Mo 7 + , Fe 7 +); (Ni 2 + , Co 1 +); (Br 2 + , Co 1 +); (Sb 3 + , Co 2 +); (Lu 3 + , Co 2 +); (Bi 3 + , Co 2 +); (Co 2 + , Ga 1 +); (Co 2 + , Sr 1 +); (Co 2 + , Y 1 +); (Y 3 + , Co 3 +); (Mo 4 + , Co 3 +); (Co 2 + , In 1 +); (Co 2 + , Ba 1 +); (Co 2 + , La 1 +); (Co 2 + , Ce 1 +); (Co 2 + , Pr 1 +); (Co 2 + , Nd 1 +); (Co 2 + , Pm 1 +); (Co 2 + , Sm 1 +); (Co 2 + , Eu 1 +); (Co 2 + , Gd 1 +); (Co 2 + , Tb 1 +); (Co 2 + , Dy 1 +); (Co 2 + , Ho 1 +); (Co 2 + , Er 1 +); (Co 2 + , Tm 1 +); (Co 2 + , Yb 1 +); (Co 2 + , Lu 1 +); (Co 2 + , Tl 1 +);

(Gd 3 + , Mn 2 +); (Tm 3 + , Mn 2 +); (Yb 3 + , Mn 2 +); (Mn 2 + , Ga 1 +); (Mn 2 + , Sr 1 +); (Mn 2 + , Y 1 +); (Y 3 + , Mn 3 +); (Mo 4 + , Mn 3 +); (Mn 2 + , In 1 +); (Mn 2 + , Ba 1 +); (Mn 2 + , La 1 +); (Mn 2 + , Ce 1 +); (Mn 2 + , Pr 1 +); (Mn 2 + , Nd 1 +); (Mn 2 + , Pm 1 +); (Mn 2 + , Sm 1 +); (Mn 2 + , Eu 1 +); (Mn 2 + , Gd 1 +); (Mn 2 + , Tb 1 +); (Co 7 + , Y 8 +); (Ni 2 + , Ni 1 +); (Br 2 + , Ni 1 +); (Ag 2 + , Ni 1 +); (Ge 3 + , Ni 2 +); (Mo 3 + , Ni 2 +); (Lu 3 + , Ni 2 +); (Bi 3 + , Ni 2 +); (Ni 2 + , Ni 1 +); (Ni 2 + , Cu 1 +); (Ni 2 + , Ge 1 +); (As 4 + , Ni 3 +); (Ni 2 + , Zr 1 +); (Ni 2 + , Nb 1 +); (Ni 2 + , Mo 1 +); (Ni 2 + , Tc 1 +); (Ni 2 + , Ru 1 +); (Ni 2 + , Rh 1 +); (Ni 2 + , Ag 1 +); (Ni 2 + , Sn 1 +); (Ni 2 + , Ta 1 +); (Ni 2 + , W 1 +); (Ni 2 + , Re 1 +); (Ni 2 + , Pb 1 +); (Ni 2 + , Bi 1 +); (Zn 4 + , Ni 4 +); (Ni 3 + , Rb 2 +); (Ni 3 , Mo 3 +); (Cu 5 + , Ni 5 +); (Ni 4 + , Br 4 +);

(Sr 7 + , Mn 6 +); (Mn 6 + , Sr 6 +); (Ni 2 + , Fe 1 +); (Br 2 + , Fe 1 +); (Sr 2 + , Fe 2 +); (Sb 3 + , Fe 2 +); (Gd 3 + , Fe 2 +); (Yb 3 + , Fe 2 +); (Te 4 + , Fe 3 +); (Zn 4 + , Fe 4 +); (Fe 3 + , Rb 2 +); (Fe 3 + , Mo 3 +); (Cu 5 + , Fe 5 +); (Fe 4 + , Br 4 +); (Br 6 + , Fe 5 +); (Nb 5 + , Fe 5 +); (Fe 5 + , Rb 5 +); (Fe 5 + , Sr 5 +); (Mo 6 + , Fe 6 +); (Zn 4 + , Cu 4 +); (Cu 3 + , Rb 2 +); (Cu 3 + , Mo 3 +); (Cu 3 + , In 3 +); (Cu 3 + , Te 3 +); (Zn 5 + , Cu 5 +); (Cu 4 + , Kr 4 +); (Cu 4 + , Rb 4 +); (Sb 5 + , Cu 5 +); (Cu 6 + , Kr 7 +); (Kr 2 + , Zn 1 +); (Cd 2 + , Zn 1 +); (Te 3 + , Zn 1 +); (Ce 3 + , Zn 1 +); (Ge 3 + , Zn 2 +); (Mo 3 + , Zn 2 +); (Lu 3 + , Zn 2 +); (Bi 3 + , Zn 2 +); (Zn 2 + , Br 1 +); (Zn 2 + , Y 2 +); (Mo 5 + , Zn 3 +); (Zn 2 + , Xe 1 +); (Zn 2 + , Eu 2 +); (Zn 2 + , Gd 2 +); (Zn 2 + , Tb 2 +); (Zn 2 + , Dy 2 +); (Zn 2 + , Ho 2 +); (Zn 2 + , Er 2 +); (Zn 2 + , Tm 2 +); (Zn 2 + , Yb 2 +);

(Co 2 + , Ra 1 +);
(Co 2 + , Ac 1 +);
(Co 2 + , Th 1 +);
(Co 2 + , Pa 1 +);
(Co 2 + , U 1 +);
(Co 2 + , Np 1 +);
(Co 2 + , Pu 1 +);
(Co 2 + , Am 1 +);
(Co 2 + , Cm 1 +);
(Co 2 + , Bk 1 +);
(Co 2 + , Cf 1 +);
(Co 2 + , Es 1 +);
(Co 4 + , Co 4 +);
(Kr 5 + , Co 4 +);
(Co 3 + , Zr 3 +);
(Co 3 + , Sm 3 +);
(Co 3 + , Ho 3 +);
(Co 3 + , Tm 3 +);
(Co 3 + , Hf 3 +);
(Co 4 + , Co 4 +);
(Co 7 + , Co 7 +);
(Co 7 + , Co 7 +);
(Y 3 + , Ge 3 +);
(Ge 2 + , Zr 1 +);
(Ge 2 + , Nb 1 +);
(Ge 2 + , Mo 1 +);
(Ge 2 + , In 1 +);
(Ge 2 + , Gd 1 +);
(Ge 2 + , Tb 1 +);
(Ge 2 + , Dy 1 +);
(Ge 2 + , Ho 1 +);
(Ge 2 + , Er 1 +);
(Ge 2 + , Tm 1 +);
(Ge 2 + , Yb 1 +);
(Ge 2 + , Hf 1 +);
(Ge 2 + , Tl 1 +);
(Ge 2 + , Th 1 +);
(Ge 2 + , Pa 1 +);
(Ge 2 + , U 1 +);
(Ge 2 + , Np 1 +);
(Ge 2 + , Pu 1 +);
(Ge 2 + , Am 1 +);
(Ge 2 + , Cm 1 +);
(Ge 2 + , Bk 1 +);
(Ge 2 + , Cf 1 +);
(Ge 2 + , Es 1 +);
(Ge 3 + , As 2 +);
(Ge 3 + , Rh 2 +);
(Ge 3 + , Te 2 +);
(Br 6 + , Ni 5 +);
(Nb 5 + , Ni 5 +);
(Ni 5 + , Cu 5 +);
(Rb 7 + , Ni 6 +);
(Ni 7 + , Zn 7 +);
(Br 2 + , Cu 1 +);
(Ag 2 + , Cu 1 +);
(Br 3 + , Cu 2 +);
(Cu 2 + , Zn 1 +);
(Ga 3 + , Cu 3 +);
(Cu 2 + , As 1 +);
(Cu 2 + , Se 1 +);
(Kr 4 + , Cu 3 +);
(Cu 2 + , Pd 1 +);
(Cu 2 + , Cd 1 +);
(Cu 2 + , Sb 1 +);
(Cu 2 + , Te 1 +);
(Cu 2 + , Os 1 +);
(Cu 2 + , Ir 1 +);
(Cu 2 + , Pt 1 +);
(Cu 2 + , Au 1 +);
(Cu 2 + , Po 1 +);
(Te 4 + , Se 3 +);
(Rb 4 + , Se 4 +);
(Se 3 + , Tc 2 +);
(Se 3 + , Sn 2 +);
(Te 5 + , Se 4 +);
(Se 3 + , Hf 2 +);
(Se 3 + , Pb 2 +);
(Se 4 + , Rb 3 +);
(Se 4 + , Sn 4 +);
(Se 4 + , Nd 4 +);
(Se 4 + , Pm 4 +);
(Se 5 + , In 4 +);
(Rb 2 + , Br 1 +);
(Pr 3 + , Br 1 +);
(Tb 3 + , Br 1 +);
(La 3 + , Br 2 +);
(Br 2 + , Pd 1 +);
(Br 2 + , Ag 1 +);
(Br 2 + , Cd 1 +);
(Br 2 + , Sb 1 +);
(Br 2 + , Ta 1 +);
(Br 2 + , W 1 +);
(Br 2 + , Re 1 +);
(Br 2 + , Os 1 +);
(Br 2 + , Po 1 +);
(Br 3 + , Pd 2 +);
(Br 3 + , In 2 +);
(Zn 3 + , Rh 3 +);
(Zn 3 + , Xe 3 +);
(Zn 3 + , Pb 3 +);
(Kr 6 + , Zn 5 +);
(Rb 7 + , Zn 6 +);
(Zn 6 + , Sr 7 +);
(Ge 2 + , Ga 1 +);
(Zr 3 + , Ga 1 +);
(I 2 + , Ga 1 +);
(Hf 3 + , Ga 1 +);
(Hg 2 + , Ga 1 +);
(Te 4 + , Ga 3 +);
(Ga 3 + , Br 3 +);
(Ga 3 + , Kr 3 +);
(Ga 3 + , Ce 4 +);
(Br 2 + , Ge 1 +);
(Se 3 + , Ge 2 +);
(Sr 2 + , Ge 2 +);
(Sb 3 + , Ge 2 +);
(Gd 3 + , Ge 2 +);
(Yb 3 + , Ge 2 +);
(Ge 2 + , Y 1 +);
(Kr 3 + , Eu 3 +);
(Kr 3 + , Yb 3 +);
(Kr 4 + , Kr 3 +);
(Y 5 + , Kr 5 +);
(Kr 4 + , Cd 3 +);
(Kr 4 + , Te 4 +);
(Kr 4 + , Ce 4 +);
(Sr 6 + , Kr 6 +);
(Kr 5 + , Nb 5 +);
(Xe 2 + , Rb 1 +);
(Pb 2 + , Rb 1 +);
(Rb 2 + , Y 2 +);
(Mo 5 + , Rb 3 +);
(Rb 2 + , Xe 1 +);
(Rb 2 + , Gd 2 +);
(Rb 2 + , Tb 2 +);
(Rb 2 + , Dy 2 +);
(Rb 2 + , Ho 2 +);
(Rb 2 + , Er 2 +);
(Rb 2 + , Tm 2 +);
(Rb 2 + , Yb 2 +);
(Rb 3 + , Nb 3 +);
(Rb 3 + , Sb 3 +);
(Rb 3 + , Cs 2 +);
(Rb 3 + , Eu 3 +);
(Rb 3 + , Yb 3 +);
(Rb 3 + , Bi 3 +);

(Ge 3 + , Pt 2 +); (Br 3 + , I 2 +); (Rb 6 + , Rb 5 +);
(Kr 2 + , As 1 +); (Br 3 + , La 3 +); (Rb 4 + , Sr 3 +);
(Nb 3 + , As 1 +); (Br 3 + , Ce 3 +); (Rb 4 + , Eu 4 +);
(Cd 2 + , As 1 +); (Br 4 + , Xe 3 +); (Rb 4 + , Er 4 +);
(Te 3 + , As 1 +); (Br 4 + , Pb 3 +); (Rb 4 + , Tm 4 +);
(Mo 3 + , As 2 +); (Y 6 + , Br 6 +); (Rb 4 + , Yb 4 +);
(Sb 4 + , As 3 +); (Br 5 + , Mo 5 +); (Rb 5 + , Sr 4 +);
(Bi 4 + , As 3 +); (Pm 3 + , Kr 1 +); (Rb 5 + , Sb 5 +);
(As 3 + , Br 2 +); (Sm 3 + , Kr 1 +); (Rb 5 + , Bi 5 +);
(Kr 5 + , As 4 +); (Dy 3 + , Kr 1 +); (Rb 6 + , Rb 5 +);
(As 3 + , Zr 3 +); (Pb 3 + , Kr 1 +); (Rb 6 + , Sr 5 +);
(As 3 + , Nd 3 +); (Kr 3 + , Kr 2 +); (Mo 6 + , Rb 7 +);
(As 3 + , Pm 3 +); (Rb 3 + , Kr 2 +); (Rb 7 + , Sb 6 +);
(As 3 + , Tb 3 +); (Kr 4 + , Kr 3 +); (Pd 2 + , Sr 1 +);
(As 3 + , Dy 3 +); (Kr 2 + , Cd 1 +); (I 2 + , Sr 1 +);
(As 3 + , Ho 3 +); (Kr 2 + , Sb 1 +); (Hf 3 + , Sr 1 +);
(As 3 + , Er 3 +); (Kr 2 + , Te 1 +); (Nb 3 + , Sr 2 +);
(As 4 + , Br 3 +); (Kr 2 + , Os 1 +); (Pr 3 + , Sr 2 +);
(Sr 5 + , As 5 +); (Kr 2 + , Ir 1 +); (Sr 4 + , Sr 3 +);
(Se 6 + , As 6 +); (Kr 2 + , Pt 1 +); (Sr 2 + , Mo 2 +);
(As 5 + , Rb 7 +); (Kr 2 + , Au 1 +); (Sr 2 + , Tc 2 +);
(Kr 2 + , Se 1 +); (Kr 3 + , Kr 2 +); (Sr 2 + , Sb 2 +);
(Cd 2 + , Se 1 +); (Kr 3 + , Nb 3 +); (Te 5 + , Sr 3 +);
(Te 3 + , Se 1 +); (Kr 3 + , Sb 3 +); (Sr 3 + , Tc 3 +);
(Ce 3 + , Se 1 +); (Kr 3 + , Cs 2 +); (Sr 3 + , Tl 3 +);
(Sr 4 + , Sr 3 +); (Eu 3 + , Nb 2 +); (Ag 2 + , Ru 1 +);
(Sr 4 + , Sb 4 +); (Dy 3 + , Nb 2 +); (Sb 3 + , Ru 2 +);
(Sr 4 + , Gd 4 +); (Ho 3 + , Nb 2 +); (Gd 3 + , Ru 2 +);
(Sr 4 + , Yb 4 +); (Er 3 + , Nb 2 +); (Lu 3 + , Ru 2 +);
(Zr 3 + , Y 1 +); (Tm 3 + , Nb 2 +); (Sb 4 + , Ru 3 +);
(Ag 2 + , Y 1 +); (Pb 3 + , Nb 2 +); (Bi 4 + , Ru 3 +);
(Hg 2 + , Y 1 +); (Nb 3 + , I 1 +); (Ag 2 + , Rh 1 +);
(Sn 3 + , Y 2 +); (Nb 3 + , Ba 2 +); (Lu 3 + , Rh 2 +);
(Nd 3 + , Y 2 +); (Nb 3 + , La 2 +); (Bi 3 + , Rh 2 +);
(Tb 3 + , Y 2 +); (Nb 3 + , Ce 2 +); (Te 4 + , Rh 3 +);
(Y 3 + , Zr 4 +); (Nb 3 + , Pr 2 +); (Rh 2 + , Cs 1 +);
(Y 3 + , Hf 4 +); (Nb 3 + , Nd 2 +); (Ce 3 + , Pd 1 +);
(Y 3 + , Hg 3 +); (Nb 3 + , Pm 2 +); (Pd 2 + , In 1 +);
(Y 4 + , La 4 +); (Nb 3 + , Sm 2 +); (Pd 2 + , Ba 1 +);
(Y 6 + , Bi 6 +); (Nb 3 + , Eu 2 +); (Pd 2 + , La 1 +);
(Zr 3 + , Zr 1 +); (Nb 3 + , Hg 1 +); (Pd 2 + , Ce 1 +);
(Ag 2 + , Zr 1 +); (Nb 3 + , Rn 1 +); (Pd 2 + , Pr 1 +);
(Hg 2 + , Zr 1 +); (Nb 3 + , Ra 2 +); (Pd 2 + , Nd 1 +);
(Sn 3 + , Zr 2 +); (Nb 4 + , Nd 3 +); (Pd 2 + , Pm 1 +);
(Nd 3 + , Zr 2 +); (Nb 4 + , Pm 3 +); (Pd 2 + , Sm 1 +);
(Pm 3 + , Zr 2 +); (Nb 4 + , Sm 3 +); (Pd 2 + , Eu 1 +);
(Sm 3 + , Zr 2 +); (Nb 4 + , Dy 3 +); (Pd 2 + , Tb 1 +);
(Dy 3 + , Zr 2 +); (Nb 4 + , Ho 3 +); (Pd 2 + , Dy 1 +);
(Nb 4 + , Zr 3 +); (Nb 4 + , Er 3 +); (Pd 2 + , Lu 1 +);

(Zr 3 + , Zr 1 +); (Zr 3 + , Nb 1 +); (Zr 3 + , Mo 1 +); (Zr 3 + , Tc 1 +); (Zr 3 + , Gd 1 +); (Zr 3 + , Tb 1 +); (Zr 3 + , Dy 1 +); (Zr 3 + , Ho 1 +); (Zr 3 + , Er 1 +); (Zr 3 + , Tm 1 +); (Zr 3 + , Yb 1 +); (Zr 3 + , Hf 1 +); (Zr 3 + , Tl 1 +); (Zr 3 + , Bi 1 +); (Zr 3 + , Th 1 +); (Zr 3 + , Pa 1 +); (Zr 3 + , U 1 +); (Zr 3 + , Np 1 +); (Zr 3 + , Pu 1 +); (Zr 3 + , Am 1 +); (Zr 3 + , Cm 1 +); (Zr 3 + , Bk 1 +); (Zr 3 + , Cf 1 +); (Zr 3 + , Es 1 +); (Zr 4 + , In 4 +); (Ag 2 + , Nb 1 +); (Hg 2 + , Nb 1 +); (Sm 3 + , Nb 2 +); (Hf 3 + , In 1 +); (Hg 2 + , In 1 +); (Sb 4 + , In 3 +); (Bi 4 + , In 3 +); (In 3 + , Bi 3 +); (Eu 3 + , Sn 2 +); (Ho 3 + , Sn 2 +); (Er 3 + , Sn 2 +); (Tm 3 + , Sn 2 +); (Pb 3 + , Sn 2 +); (Te 4 + , Sn 3 +); (Pb 4 + , Sn 4 +); (Sn 4 + , Sb 4 +); (Sn 4 + , Gd 4 +); (Sn 4 + , Lu 4 +); (Ce 3 + , Sb 1 +); (Sb 3 + , Sb 2 +); (Gd 3 + , Sb 2 +); (Yb 3 + , Sb 2 +); (Sb 3 + , Sb 2 +); (Sb 3 + , Bi 2 +);

(Nb 4 + , Hf 3 +); (Mo 7 + , Nb 7 +); (Ag 2 + , Mo 1 +); (Hg 2 + , Mo 1 +); (Sb 3 + , Mo 2 +); (Gd 3 + , Mo 2 +); (Yb 3 + , Mo 2 +); (Mo 3 + , Rh 2 +); (Mo 3 + , In 2 +); (Mo 3 + , Te 2 +); (Mo 3 + , I 2 +); (Mo 3 + , La 3 +); (Mo 3 + , Pt 2 +); (Mo 3 + , Hg 2 +); (Mo 4 + , Pd 3 +); (Mo 4 + , I 3 +); (Mo 4 + , Hf 4 +); (Bi 5 + , Mo 5 +); (Mo 5 + , Sn 4 +); (Mo 5 + , Nd 4 +); (Mo 5 + , Tb 4 +); (Ag 2 + , Tc 1 +); (Eu 3 + , Tc 2 +); (Ho 3 + , Tc 2 +); (Er 3 + , Tc 2 +); (Tm 3 + , Tc 2 +); (Yb 3 + , Tc 2 +); (Pb 3 + , Tc 2 +); (Tb 3 + , Xe 1 +); (Xe 2 + , Cs 1 +); (Pb 2 + , Cs 1 +); (Hf 3 + , Ba 1 +); (Hf 3 + , La 1 +); (Pr 3 + , La 2 +); (La 3 + , Pr 3 +); (La 3 + , Nd 3 +); (La 3 + , Pm 3 +); (La 3 + , Tb 3 +); (La 3 + , Dy 3 +); (La 3 + , Ho 3 +); (La 3 + , Er 3 +); (Hf 3 + , Ce 1 +); (Pr 3 + , Ce 2 +); (Ce 3 + , Os 1 +); (Ce 3 + , Ir 1 +); (Ce 3 + , Pt 1 +); (Ce 3 + , Au 1 +); (Ce 3 + , Po 1 +); (Hf 3 + , Pr 1 +);

(Pd 2 + , Ra 1 +); (Pd 2 + , Ac 1 +); (Pd 2 + , Pa 1 +); (Ag 2 + , Ag 1 +); (La 3 + , Ag 2 +); (Ag 2 + , Ag 1 +); (Ag 2 + , Sn 1 +); (Ag 2 + , Hf 1 +); (Ag 2 + , Pb 1 +); (Ag 2 + , Bi 1 +); (Ag 2 + , Es 1 +); (Cd 2 + , Cd 1 +); (Te 3 + , Cd 1 +); (Ce 3 + , Cd 1 +); (Sb 3 + , Cd 2 +); (Gd 3 + , Cd 2 +); (Lu 3 + , Cd 2 +); (Bi 3 + , Cd 2 +); (Cd 2 + , Cd 1 +); (Cd 2 + , Te 1 +); (Cd 2 + , I 1 +); (Cd 2 + , Ba 2 +); (Cd 2 + , Ir 1 +); (Cd 2 + , Pt 1 +); (Cd 2 + , Au 1 +); (Cd 2 + , Hg 1 +); (Cd 2 + , Ra 2 +); (I 2 + , In 1 +); (Hg 2 + , Tb 1 +); (Tb 3 + , Tb 2 +); (Tb 3 + , Tb 2 +); (Tb 3 + , Dy 2 +); (Tb 3 + , Ho 2 +); (Tb 3 + , Er 2 +); (Tb 3 + , Tm 2 +); (Tb 3 + , Yb 2 +); (Hf 3 + , Dy 1 +); (Hg 2 + , Dy 1 +); (Dy 3 + , Lu 2 +); (Pb 4 + , Dy 4 +); (Hf 3 + , Ho 1 +); (Hg 2 + , Ho 1 +); (Ho 3 + , Hf 2 +); (Ho 3 + , Pb 2 +); (Hf 3 + , Er 1 +); (Hg 2 + , Er 1 +); (Er 3 + , Hf 2 +); (Er 3 + , Pb 2 +); (Hf 3 + , Tm 1 +);

(Sb 4 + , Te 3 +);
(Te 3 + , Te 1 +);
(Ce 3 + , Te 1 +);
(Bi 4 + , Te 3 +);
(Te 3 + , Te 1 +);
(Te 3 + , Ba 2 +);
(Te 3 + , Ir 1 +);
(Te 3 + , Pt 1 +);
(Te 3 + , Au 1 +);
(Te 3 + , Ra 2 +);
(Te 5 + , Eu 4 +);
(Te 5 + , Ho 4 +);
(Te 5 + , Er 4 +);
(Te 5 + , Tm 4 +);
(Te 5 + , Pb 4 +);
(I 2 + , Ba 1 +);
(I 2 + , La 1 +);
(I 2 + , Ce 1 +);
(I 2 + , Pr 1 +);
(I 2 + , Nd 1 +);
(I 2 + , Pm 1 +);
(I 2 + , Sm 1 +);
(I 2 + , Eu 1 +);
(I 2 + , Tb 1 +);
(I 2 + , Dy 1 +);
(I 2 + , Lu 1 +);
(I 2 + , Ra 1 +);
(I 2 + , Ac 1 +);
(I 2 + , Pa 1 +);
(I 2 + , Am 1 +);
(Nd 3 + , Xe 1 +);
(Hg 2 + , Bk 1 +);
(Pb 3 + , Pb 2 +);
(As 2 + , H);
(Ru 2 + , H);
(In 2 + , H);
(Te 2 + , H);
(Al 2 + , H);
(Ar 1 + , H);
(As 2 + , Li);
(Ru 2 + , Li);
(In 2 + , Li);
(Te 2 + , Li);
(Al 2 + , Li);
(Ar 1 + , Li);
(Ti 2 + , Li);
(As 2 + , B);
(Rb 1 + , B);
(Mo 2 + , B);

(Pr 3 + , Pr 2 +);
(Pr 3 + , Pr 2 +);
(Pr 3 + , Nd 2 +);
(Pr 3 + , Pm 2 +);
(Pr 3 + , Sm 2 +);
(Pr 3 + , Eu 2 +);
(Pr 3 + , Tb 2 +);
(Pr 3 + , Dy 2 +);
(Pr 3 + , Ho 2 +);
(Pr 3 + , Er 2 +);
(Pr 3 + , Rn 1 +);
(Hf 3 + , Nd 1 +);
(Nd 3 + , Gd 2 +);
(Nd 3 + , Er 2 +);
(Nd 3 + , Tm 2 +);
(Nd 3 + , Yb 2 +);
(Pb 4 + , Nd 4 +);
(Hf 3 + , Pm 1 +);
(Pm 3 + , Lu 2 +);
(Pb 4 + , Pm 4 +);
(Hf 3 + , Sm 1 +);
(Sm 3 + , Lu 2 +);
(Pb 4 + , Sm 4 +);
(Hf 3 + , Eu 1 +);
(Eu 3 + , Hf 2 +);
(Eu 3 + , Pb 2 +);
(Hf 3 + , Gd 1 +);
(Hg 2 + , Gd 1 +);
(Tb 3 + , Gd 2 +);
(Gd 3 + , Bi 2 +);
(Hf 3 + , Tb 1 +);
(Hg 2 + , Cf 1 +);
(Pb 3 + , Pb 2 +);
(K 1 + , F);
(Cr 2 + , F);
(Fe 2 , F);
(As 2 + , Na);
(Ru 2 + , Na);
(In 2 + , Na);
(Te 2 + , Na);
(Al 2 + , Na);
(Ar 1 + , Na);
(Ti 2 + , Na);
(As 2 + , Al);
(Ru 2 + , Al);
(In 2 + , Al);
(Te 2 + , Al);
(Al 2 + , Al);
(Ar 1 + , Al);

(Hg 2 + , Tm 1 +);
(Tm 3 + , Hf 2 +);
(Tm 3 + , Pb 2 +);
(Hf 3 + , Yb 1 +);
(Hg 2 + , Yb 1 +);
(Yb 3 + , Bi 2 +);
(Hf 3 + , Lu 1 +);
(Pb 3 + , Lu 2 +);
(Lu 3 + , Bi 2 +);
(Hg 2 + , Hf 1 +);
(Pb 3 + , Hf 2 +);
(Hf 3 + , Tl 1 +);
(Hf 3 + , Ra 1 +);
(Hf 3 + , Ac 1 +);
(Hf 3 + , Th 1 +);
(Hf 3 + , Pa 1 +);
(Hf 3 + , U 1 +);
(Hf 3 + , Np 1 +);
(Hf 3 + , Pu 1 +);
(Hf 3 + , Am 1 +);
(Hf 3 + , Cm 1 +);
(Hf 3 + , Bk 1 +);
(Hf 3 + , Cf 1 +);
(Hg 2 + , Tl 1 +);
(Hg 2 + , Th 1 +);
(Hg 2 + , Pa 1 +);
(Hg 2 + , U 1 +);
(Hg 2 + , Np 1 +);
(Hg 2 + , Pu 1 +);
(Hg 2 + , Am 1 +);
(Hg 2 + , Cm 1 +);
(Hg 2 + , Es 1 +);
(K 1 + , Cl);
(Cr 2 + , Cl);
(Fe 2 + , Cl);
(As 2 + , K);
(Ru 2 + , K);
(In 2 + , K);
(Te 2 + , K);
(Al 2 + , K);
(Ar 1 + , K);
(As 2 + , Fe);
(Ru 2 + , Fe);
(In 2 + , Fe);
(Te 2 + , Fe);
(Al 2 + , Fe);
(Ar 1 + , Fe);
(Ti 2 + , Fe);
(As 2 + , Co);

(Ru 2 + , B); (Ti 2 + , Al); (Ru 2 + , Co);
(In 2 + , B); (As 2 + , Si); (In 2 + , Co);
(Te 2 + , B); (Tc 2 + , Si); (Te 2 + , Co);
(Al 2 + , B); (Ru 2 + , Si); (Al 2 + , Co);
(Ar 1 + , B); (Tl 2 + , Si); (V 2 + , Co);
(Ti 2 + , B); (N 1 + , Si); (Tc 2 + , Cu);
(As 2 + , C); (Al 2 + , Si); (Tl 2 + , Cu);
(Tc 2 + , C); (V 2 + , Si); (N 1 + , Cu);
(Ru 2 + , C); (As 2 + , P); (P 2 + , Cu);
(In 2 + , C); (Ru 2 + , P); (V 2 + , Cu);
(Te 2 + , C); (In 2 + , P); (Ga 2 + , Br);
(N 1 + , C); (Te 2 + , P); (Se 2 + , Br);
(Al 2 + , C); (Al 2 + , P); (Rh 2 + , Br);
(V 2 + , C); (Ar 1 + , P); (Sn 2 + , Br);
(As 2 + , O); (Tc 2 + , S); (P 2 + , Br);
(Tc 2 + , O); (Sn 2 + , S); (K 1 + , Br);
(Ru 2 + , O); (Tl 2 + , S); (Cr 2 + , Br);
(Tl 2 + , O); (N 1 + , S); (Fe 2 + , Br);
(N 1 + , O); (P 2 + , S); (As 2 + , Rb);
(Al 2 + , O); (V 2 + , S); (Rb 1 + , Rb);
(V 2 + , O); (Ga 2 + , Cl); (Mo 2 + , Rb);
(Ga 2 + , F); (Se 2 + , Cl); (Ru 2 + , Rb);
(Se 2 + , F); (Rh 2 + , Cl); (In 2 + , Rb);
(Rh 2 + , F); (Sn 2 + , Cl); (Te 2 + , Rb);
(Sn 2 + , F); (Xe 2 + , Cl); (Al 2 + , Rb);
(Pb 2 + , F); (Pb 2 + , Cl); (Ru 2 + , Pb);
(Ar 1 + , Rb); (P 2 + , Tl); (In 2 + , Pb);
(Ti 2 + , Rb); (V 2 + , Tl); (Te 2 + , Pb);
(Ga 2 + , I); (Tc 2 + , Au); (Al 2 + , Pb);
(Se 2 + , I); (Sn 2 + , Au); (V 2 + , Pb);
(Rh 2 + , I); (Tl 2 + , Au); (Tc 2 + , Po);
(Sn 2 + , I); (N 1 + , Au); (Tl 2 + , Po);
(P 2 + , I); (P 2 + , Au); (N 1 + , Po);
(Cr 2 + , I); (V 2 + , Au); (P 2 + , Po);
(Fe 2 + , I); (As 2 + , Hg); (V 2 + , Po);
(As 2 + , Cs); (Tc 2 + , Hg); (Ga 2 + , At);
(Rb 1 + , Cs); (Ru 2 + , Hg); (Se 2 + , At);
(Mo 2 + , Cs); (Tl 2 + , Hg); (Rh 2 + , At);
(Ru 2 + , Cs); (N 1 + , Hg); (Sn 2 + , At);
(In 2 + , Cs); (Al 2 + , Hg); (Tl 2 + , At);
(Te 2 + , Cs); (V 2 + , Hg); (N 1 + , At);
(Al 2 + , Cs); (As 2 + , As); (P 2 + , At);
(Ar 1 + , Cs); (Ru 2 + , As); (Cr 2 + , At);
(Ti 2 + , Cs); (In 2 + , As); (Fe 2 + , At);
(Tc 2 + , Se); (Te 2 + , As); (As 2 + , Ge);
(Tl 2 + , Se); (Al 2 + , As); (Tc 2 + , Ge);
(N 1 + , Se); (Ar 1 + , As); (Ru 2 + , Ge);
(P 2 + , Se); (Ti 2 + , As); (In 2 + , Ge);
(V 2 + , Se); (As 2 + , Ce); (N 1 + , Ge);

(Tc 2 + , Te); (Tc 2 + , Ce); (Al 2 + , Ge);
(Sn 2 + , Te); (Ru 2 + , Ce); (V 2 + , Ge);
(Tl 2 + , Te); (In 2 + , Ce); (As 2 + , Ga);
(N 1 + , Te); (N 1 + , Ce); (Rb 1 + , Ga);
(P 2 + , Te); (Al 2 + , Ce); (Ru 2 + , Ga);
(V 2 + , Te); (V 2 + , Ce); (In 2 + , Ga);
(Fe 2 + , Te); (As 2 + , Fr); (Te 2 + , Ga);
(As 2 + , As); (Rb 1 + , Fr); (Al 2 + , Ga);
(Ru 2 + , As); (Ru 2 + , Fr); (Ar 1 + , Ga);
(In 2 + , As); (In 2 + , Fr); (Ti 2 + , Ga);
(Te 2 + , As); (Te 2 + , Fr); (As 2 + , In);
(Al 2 + , As); (Al 2 + , Fr); (Rb 1 + , In);
(Ar 1 + , As); (Ar 1 + , Fr); (Mo 2 + , In);
(Ti 2 + , As); (Ti 2 + , Fr); (Ru 2 + , In);
(Tc 2 + , Sb); (As 2 + , Ge); (In 2 + , In);
(Tl 2 + , Sb); (Tc 2 + , Ge); (Te 2 + , In);
(N 1 + , Sb); (Ru 2 + , Ge); (Al 2 + , In);
(P 2 + , Sb); (In 2 + , Ge); (Ar 1 + , In);
(V 2 + , Sb); (N 1 + , Ge); (Ti 2 + , In);
(As 2 + , Bi); (Al 2 + , Ge); (As 2 + , Ag);
(Ru 2 + , Bi); (V 2 + , Ge); (Tc 2 + , Ag);
(In 2 + , Bi); (As 2 + , Sn); (Ru 2 + , Ag);
(Te 2 + , Bi); (Tc 2 + , Sn); (N 1 + , Ag);
(Al 2 + , Bi); (Ru 2 + , Sn); (Al 2 + , Ag);
(Ar 1 + , Bi); (N 1 + , Sn); (V 2 + , Ag);
(Tc 2 + , Tl); (Al 2 + , Sn); (P 2 + , OH);
(Sn 2 + , Tl); (V 2 + , Sn); (V 2 + , OH);
(Tl 2 + , Tl); (As 2 + , Pb); (Tc 2 + , SH);
(N 1 + , Tl); (Tc 2 + , Pb); (Sn 2 + , SH);
(Ga 2 + , BF3); (Rh 2 + , UF6); (Tl 2 + , SH);
(Se 2 + , BF3); (Sn 2 + , UF6); (N 1 + , SH);
(Tc 2 + , BF3); (Tl 2 + , UF6); (P 2 + , SH);
(Rh 2 + , BF3); (P 2 + , UF6); (V 2 + , SH);
(Sn 2 + , BF3); (Cr 2 + , UF6); (Fe 2 + , SH);
(Tl 2 + , BF3); (Fe 2 + , UF6); (Ga 2 + , CN);
(N 1 + , BF3); (Tc 2 + , CF3); (Se 2 + , CN);
(P 2 + , BF3); (Tl 2 + , CF3); (Rh 2 + , CN);
(Cr 2 + , BF3); (N 1 + , CF3); (Sn 2 + , CN);
(Fe 2 + , BF3); (P 2 + , CF3); (P 2 + , CN);
(Se 2 + , NO2); (V 2 + , CF3); (K 1 + , CN);
(Rh 2 + , NO2); (As 2 + , CCl3); (Cr 2 + , CN);
(Xe 2 + , NO2); (Tc 2 + , CCl3); (Fe 2 + , CN);
(Pb 2 + , NO2); (Ru 2 + , CCl3); (Tc 2 + , SCN);
(K 1 + , NO2); (In 2 + , CCl3); (Sn 2 + , SCN);
(Cr 2 + , NO2); (N 1 + , CCl3); (Tl 2 + , SCN);
(As 2 + , O2); (Al 2 + , CCl3); (N 1 + , SCN);
(Rb 1 + , O2); (V 2 + , CCl3); (P 2 + , SCN);
(Ru 2 + , O2); (Ga 2 + , SiF3); (V 2 + , SCN);
(In 2 + , O2); (Se 2 + , SiF3); (Fe 2 + , SCN);

(	Te 2 +	,	O2	);	(	Rh 2 +	,	SiF3	);	(	Ga 2 +	,	SeCN	);
(	Al 2 +	,	O2	);	(	Sn 2 +	,	SiF3	);	(	Se 2 +	,	SeCN	);
(	Ar 1 +	,	O2	);	(	P 2 +	,	SiF3	);	(	Tc 2 +	,	SeCN	);
(	Ti 2 +	,	O2	);	(	K 1 +	,	SiF3	);	(	Rh 2 +	,	SeCN	);
(	As 2 +	,	SF6	);	(	Cr 2 +	,	SiF3	);	(	Sn 2 +	,	SeCN	);
(	Tc 2 +	,	SF6	);	(	Fe 2 +	,	SiF3	);	(	Tl 2 +	,	SeCN	);
(	Ru 2 +	,	SF6	);	(	As 2 +	,	NH2	);	(	N 1 +	,	SeCN	);
(	Tl 2 +	,	SF6	);	(	Tc 2 +	,	NH2	);	(	P 2 +	,	SeCN	);
(	N 1 +	,	SF6	);	(	Ru 2 +	,	NH2	);	(	Cr 2 +	,	SeCN	);
(	Al 2 +	,	SF6	);	(	In 2 +	,	NH2	);	(	Fe 2 +	,	SeCN	);
(	V 2 +	,	SF6	);	(	Te 2 +	,	NH2	);	(	Tl 2 +	,	PH 2	);
(	Ga 2 +	,	WF6	);	(	N 1 +	,	NH2	);	(	N 1 +	,	PH 2	);
(	Se 2 +	,	WF6	);	(	Al 2 +	,	NH2	);	(	Al 2 +	,	PH 2	);
(	Tc 2 +	,	WF6	);	(	V 2 +	,	NH2	);	(	V 2 +	,	PH 2	);
(	Rh 2 +	,	WF6	);	(	Tc 2 +	,	PH 2	);	(	Tc 2 +	,	OH	);
(	Sn 2 +	,	WF6	);	(	Ru 2 +	,	PH 2	);	(	Tl 2 +	,	OH	);
(	Tl 2 +	,	WF6	);	(	Fe 2 +	,	WF6	);	(	N 1 +	,	OH	);
(	N 1 +	,	WF6	);	(	Ga 2 +	,	UF6	);	(	Cr 2 +	,	WF6	); and
					(	Se 2 +	,	UF6	);		(P 2 +	,	WF6	).

72. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises structure for providing an electrochemical, chemical, photochemical, thermal, free radical, sonic, nuclear, inelastic photon, or particle scattering reaction, or mixtures thereof.

73. (Previously Presented) A reactor according to claim 42, wherein said source of catalyst comprises at least one selected from the group consisting of: (Na^+, Sc^+), (Ca^{2+}, Se^+), (K^{2+}, K^+), (Mo^{3+}, Li^+), and (Ge^{3+}, K^+).

74. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst provides a transfer of at least one electron between participating species including atoms, ions, molecules, and ionic and molecular compounds, which total energy transfer equals approximately mp^2 * 48.6 eV where m and p are positive integers.

75. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst provides a transfer of at least one electron between participating species including atoms, ions, molecules, and ionic and molecular compounds, which total energy transfer equals approximately m * 31.94 eV where m is a positive integer.

76. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst provides a transfer of at least one electron between participating species including atoms, ions, molecules, and ionic and molecular compounds, which total energy transfer equals approximately m * 95.7 eV where m is a positive integer.

77. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst provides a transfer of at least one electron between participating species including atoms, ions, molecules, and ionic and molecular compounds, which total energy transfer equals approximately m * 67.8 eV where m is a positive integer.

78. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst having a net enthalpy of reaction of approximately mp^2 * 48.6 eV, where m and p are positive integers.

79. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst is adapted to provide a resonant absorption with the energy released by molecular hydrogen when molecular hydrogen undergoes a transition to a lower energy state.

80. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst comprises at least one ion pair selected from the group consisting of:

(Ga 3 + , H 1 +);	(He 1 + , Tb 1 +);	(Li 2 + , Mn 5 +);
(As 4 + , H 1 +);	(He 1 + , Dy 1 +);	(Li 2 + , Fe 5 +);
(Y 3 + , H 1 +);	(He 1 + , Ho 1 +);	(Li 2 + , Ni 5 +);
(Mo 4 + , H 1 +);	(He 1 + , Er 1 +);	(Li 2 + , Sn 5 +);
(Sc 3 + , He 1 +);	(He 1 + , Tm 1 +);	(Ar 3 + , Be 1 +);
(Mn 4 + , He 1 +);	(He 1 + , Yb 1 +);	(Zn 3 + , Be 1 +);
(Fe 4 + , He 1 +);	(He 1 + , Lu 1 +);	(Sr 3 + , Be 1 +);
(Sr 4 + , He 1 +);	(He 1 + , Hf 1 +);	(Sb 4 + , Be 1 +);
(Sn 4 + , He 1 +);	(He 1 + , Tl 1 +);	(Te 4 + , Be 1 +);
(He 1 + , Li 1 +);	(He 1 + , Pb 1 +);	(Ca 3 + , Be 2 +);
(He 1 + , Na 1 +);	(He 1 + , Bi 1 +);	(V 4 + , Be 2 +);
(He 1 + , Mg 1 +);	(He 1 + , Ra 1 +);	(Se 4 + , Be 2 +);
(He 1 + , Al 1 +);	(He 1 + , Ac 1 +);	(Be 2 + , Sr 7 +);
(He 1 + , K 1 +);	(He 1 + , Th 1 +);	(Be 3 + , Ti 8 +);
(He 1 + , Ca 1 +);	(He 1 + , Pa 1 +);	(Ni 3 + , B 1 +);
(He 1 + , Sc 1 +);	(He 1 + , U 1 +);	(Cu 3 + , B 1 +);
(He 1 + , Ti 1 +);	(He 1 + , Np 1 +);	(Sr 3 + , B 1 +);
(He 1 + , V 1 +);	(He 1 + , Pu 1 +);	(Sb 4 + , B 1 +);
(He 1 + , Cr 1 +);	(He 1 + , Am 1 +);	(Te 4 + , B 1 +);
(He 1 + , Mn 1 +);	(He 1 + , Cm 1 +);	(Bi 4 + , B 1 +);
(He 1 + , Ni 1 +);	(He 1 + , Bk 1 +);	(S 4 + , B 2 +);
(He 1 + , Cu 1 +);	(He 1 + , Cf 1 +);	(Sc 3 + , B 2 +);
(He 1 + , Ga 1 +);	(He 1 + , Es 1 +);	(Mn 4 + , B 2 +);
(He 1 + , Rb 1 +);	(Fe 3 + , Li 1 +);	(Fe 4 + , B 2 +);
(He 1 + , Sr 1 +);	(Ni 3 + , Li 1 +);	(Sn 4 + , B 2 +);
(He 1 + , Y 1 +);	(Cu 3 + , Li 1 +);	(Zn 3 + , C 1 +);
(He 1 + , Zr 1 +);	(Kr 3 + , Li 1 +);	(Y 3 + , C 1 +);
(He 1 + , Nb 1 +);	(In 3 + , Li 1 +);	(Mo 4 + , C 1 +);
(He 1 + , Mo 1 +);	(Li 1 + , Al 3 +);	(Na 2 + , C 2 +);
(He 1 + , Tc 1 +);	(Li 1 + , Ar 2 +);	(Sc 3 + , C 2 +);
(He 1 + , Ru 1 +);	(Li 1 + , Ti 3 +);	(Mn 4 + , C 2 +);
(He 1 + , Rh 1 +);	(Li 1 + , As 3 +);	(Sn 4 + , C 2 +);
(He 1 + , Ag 1 +);	(Li 1 + , Rb 2 +);	(Ga 3 + , N 1 +);
(He 1 + , In 1 +);	(Li 1 + , Nb 3 +);	(As 4 + , N 1 +);
(He 1 + , Cs 1 +);	(Li 1 + , Mo 3 +);	(Y 3 + , N 1 +);
(He 1 + , Ba 1 +);	(Li 1 + , Ru 3 +);	(Mo 4 + , N 1 +);
(He 1 + , La 1 +);	(Li 1 + , In 3 +);	(Mg 2 + , N 2 +);
(He 1 + , Ce 1 +);	(Li 1 + , Sb 3 +);	(Co 4 + , N 2 +);
(He 1 + , Pr 1 +);	(Li 1 + , Te 3 +);	(Ne 3 + , N 3 +);
(He 1 + , Nd 1 +);	(Li 1 + , Cs 2 +);	(N 3 + , Rb 2 +);
(He 1 + , Pm 1 +);	(Li 1 + , Bi 3 +);	(Nb 6 + , N 4 +);
(He 1 + , Sm 1 +);	(Li 2 + , Li 2 +);	(N 3 + , Mo 3 +);
(He 1 + , Eu 1);	(Li 2 + , S 5 +);	(Ga 3 + , O 1 +);
(He 1 + , Gd 1 +);	(Li 2 + , Sc 4 +);	(As 4 + , O 1 +);
(Y 3 + , O 1 +);	(Mn 3 + , K 1 +);	(Sc 4 + , Se 4 +);
(Mo 4 + , O 1 +);	(Fe 3 + , K 1 +);	(Sc 4 + , Sr 3 +);
(K 4 + , O 2 +);	(Co 3 + , K 1 +);	(Sc 4 + , Sb 4 +);
(Fe 3 + , Mg 1 +);	(Ni 3 + , K 1 +);	(Sc 4 + , Pm 4 +);
(Ni 3 + , Mg 1 +);	(In 3 + , K 1 +);	(Sc 4 + , Sm 4 +);

(Cu 3 + , Mg 1 +);	(Fe 3 + , Ca 1 +);	(Sc 4 + , Eu 4 +);
(Sr 3 + , Mg 1 +);	(Ni 3 + , Ca 1 +);	(Sc 4 + , Gd 4 +);
(Sb 4 + , Mg 1 +);	(Cu 3 + , Ca 1 +);	(Sc 4 + , Dy 4 +);
(V 4 + , Mg 2 +);	(In 3 + , Ca 1 +);	(Sc 4 + , Ho 4 +);
(Ga 3 + , Mg 2 +);	(Sb 4 + , Ca 1 +);	(Sc 4 + , Er 4 +);
(As 4 + , Mg 2 +);	(Bi 4 + , Ca 1 +);	(Sc 4 + , Tm 4 +);
(Kr 4 + , Mg 2 +);	(Zn 3 + , Ca 2 +);	(Sc 4 + , Yb 4 +);
(Y 3 + , Mg 2 +);	(Y 3 + , Ca 2 +);	(Sc 4 + , Pb 4 +);
(Mg 2 + , Si 3 +);	(Mo 4 + , Ca 2 +);	(Fe 3 + , Ti 1 +);
(Mg 2 + , K 2 +);	(Te 4 + , Ca 2 +);	(Ni 3 + , Ti 1 +);
(Mg 2 + , Cr 3 +);	(Ca 2 + , Rb 1 +);	(Cu 3 + , Ti 1 +);
(Mg 2 + , Fe 3 +);	(Ca 2 + , Cs 1 +);	(Sr 3 + , Ti 1 +);
(Mg 2 + , Co 3 +);	(Ca 3 + , Co 2 +);	(In 3 + , Ti 1 +);
(Mg 2 + , Ga 3 +);	(Ca 3 + , Ni 2 +);	(Sb 4 + , Ti 1 +);
(Mg 2 + , Se 3 +);	(Ca 3 + , Cu 2 +);	(Bi 4 + , Ti 1 +);
(Mg 2 + , Rh 3 +);	(Ca 3 + , Zn 2 +);	(Ga 3 + , Ti 2 +);
(Mg 2 + , Pd 3 +);	(Ca 3 + , As 2 +);	(As 4 + , Ti 2 +);
(Mg 2 + , Sn 3 +);	(Fe 3 + , Sc 1 +);	(Y 3 + , Ti 2 +);
(Mg 2 + , I 3 +);	(Ni 3 + , Sc 1 +);	(Mo 4 + , Ti 2 +);
(Mg 2 + , Xe 3 +);	(Cu 3 + , Sc 1 +);	(Fe 4 + , Ti 3 +);
(Mg 2 + , Hf 4 +);	(In 3 + , Sc 1 +);	(Ni 4 + , Ti 3 +);
(Mg 2 + , Tl 3 +);	(Sb 4 + , Sc 1 +);	(Y 4 + , Ti 3 +);
(Mg 2 + , Pb 3 +);	(Bi 4 + , Sc 1 +);	(Fe 3 + , V 1 +);
(Bi 4 + , Al 1 +);	(Zn 3 + , Sc 2 +);	(Ni 3 + , V 1 +);
(Ca 3 + , Al 2 +);	(Y 3 + , Sc 2 +);	(Cu 3 + , V 1 +);
(Cu 3 + , Al 1 +);	(Mo 4 + , Sc 2 +);	(Sr 3 + , V 1 +);
(In 3 + , Al 1 +);	(Sc 3 + , Sc 3 +);	(In 3 + , V 1 +);
(Ni 3 + , Al 1 +);	(Mn 4 + , Sc 3 +);	(Sb 4 + , V 1 +);
(Rb 3 + , Al 1 +);	(Fe 4 + , Sc 3 +);	(Bi 4 + , V 1 +);
(Sb 4 + , Al 1 +);	(Sr 4 + , Sc 3 +);	(V 4 + , V 2 +);
(Cr 4 + , Al 2 +);	(Sn 4 + , Sc 3 +);	(Ga 3 + , V 2 +);
(Se 4 + , Al 2 +);	(Sc 3 + , Sc 3 +);	(As 4 + , V 2+);
(Pb 4 + , Al 2 +);	(Sc 3 + , Kr 2 +);	(Y 3 + , V +);
(Y 4 + , Al 3 +);	(Sc 3 + , Zr 3 +);	(Co 4 + , V 3 +);
(Fe 3 + , Si 1 +);	(Sc 3 + , Nb 3 +);	(Cu 4 + , V 3 +);
(Ni 3 + , Si 1 +);	(Sc 3 + , Sb 3 +);	(Y 4 + , V 3 +);
(Cu 3 + , Si 1 +);	(Sc 3 + , Cs 2 +);	(Mn 5 + , V 4 +);
(Sr 3 + , Si 1 +);	(Sc 3 + , Sm 3 +);	(Ge 4 + , V 4 +);
(Sb 4 + , Si 1 +);	(Sc 3 + , Eu 3 +);	(V 4 + , V 2 +);
(Te 4 + , Si 1 +);	(Sc 3 + , Tm 3 +);	(V 4 + , Cr 2 +);
(Bi 4 + , Si 1 +);	(Sc 3 + , Yb 3 +);	(V 4 + , Fe 2 +);
(V 4 + , Si 2 +);	(Sc 3 + , Hf 3 +);	(V 4 + , Co 2 +);
(Ga 3 + , Si 2 +);	(Sc 3 + , Bi 3 +);	(V 4 + , Ni 2 +);
(As 4 + , Si 2 +);	(Sc 4 + , Ti 4 +);	(V 4 + , Zn 2 +);
(V 4 + , Ge 2 +);	(Cr 4 + , Tb 3 +);	(Mn 4 + , Bi 3 +);
(V 4 + , Mo 2 +);	(Cr 4 + , Lu 3 +);	(Mn 5 + , Ge 4 +);
(V 4 + , Tc 2 +);	(Cr 4 + , Au 2 +);	(Mn 5 + , Br 4 +);
(V 4 + , Ru 2 +);	(Cr 4 + , Hg 2 +);	(Mn 5 + , Mo 4 +);
(V 4 + , Rh 2 +);	(Cr 4 + , Tl 2 +);	(Mn 5 + , Lu 4 +);

(V 4 + , Cd 2 +);	(Cr 5 + , Se 4 +);	(Mn 5.+ , Bi 4 +);
(V 4 + , Sn 2 +);	(Cr 5 + , Rb 3 +);	(Fe 3 + , Fe 1 +);
(V 4 + , Sb 2 +);	(Cr 5 + , Sr 3 +);	(Ni 3 + , Fe 1 +);
(V 4 + , Te 2 +);	(Cr 5 + , Sn 4 +);	(Cu 3 + , Fe 1 +);
(V 4 + , Hf 2 +);	(Cr 5 + , Nd 4 +);	(Sr 3 + , Fe 1 +);
(V 4 + , Pt 2 +);	(Cr 5 + , Pm 4 +);	(Sb 4 + , Fe 1 +);
(V 4 + , Pb 2 +);	(Cr 5 + , Sm 4 +);	(Bi 4 + , Fe 1 +);
(V 4 + , Bi 2 +);	(Cr 5 + , Eu 4 +);	(Ga 3 + , Fe 2 +);
(V 5 + , Co 5 +);	(Cr 5 + , Dy 4 +);	(As 4 + , Fe 2 +);
(V 5 + , Cu 5 +);	(Cr 5 + , Ho 4 +);	(Co 4 + , Fe 3 +);
(V 5 + , Kr 6 +);	(Cr 5 + , Er 4 +);	(Fe 3 + , Fe 1 +);
(V 5 + , Zr 5 +);	(Cr 5 + , Tm 4 +);	(Fe 3 + , Co 1 +);
(V 6 + , Co 6 +);	(Cr 5 + , Yb 4 +);	(Fe 3 + , Ni 1 +);
(V 7 + , Fe 7 +);	(Cr 5 + , Pb 4 +);	(Fe 3 + , Cu 1 +);
(Fe 3 + , Cr 1 +);	(Fe 3 + , Mn 1 +);	(Fe 3 + , Ga 1 +);
(Ni 3 + , Cr 1 +);	(Ni 3 + , Mn 1 +);	(Fe 3 + , Ge 1 +);
(Cu 3 + , Cr 1 +);	(Cu 3 + , Mn 1 +);	(Fe 3 + , Sr 1 +);
(Sr 3 + , Cr 1 +);	(Sr 3 + , Mn 1 +);	(Fe 3 + , Y 1 +);
(In 3 + , Cr 1 +);	(Sb 4 + , Mn 1 +);	(Fe 3 + , Zr 1 +);
(Sb 4 + , Cr 1 +);	(Bi 4 + , Mn 1 +);	(Fe 3 + , Nb 1 +);
(Bi 4 + , Cr 1 +);	(Ga 3 + , Mn 2 +);	(Nb 5 + , Fe 4 +);
(Ga 3 + , Cr 2 +);	(As 4 + , Mn 2 +);	(Fe 3 + , Mo 1 +);
(As 4 + , Cr 2 +);	(Se 5 + , Mn 3 +);	(Fe 3 + , Tc 1 +);
(Kr 4 + , Cr 2 +);	(Zr 4 + , Mn 3 +);	(Fe 3 + , Ru 1 +);
(Co 4 + , Cr 3 +);	(Fe 5 + , Mn 4 +);	(Fe 3 + , Rh 1 +);
(Cu 4 + , Cr 3 +);	(Mn 3 + , Rb 1 +);	(Fe 3 + , Ag 1 +);
(Kr 5 + , Cr 3 +);	(Mn 3 + , Cs 1 +);	(Fe 3 + , In 1 +);
(Zr 4 + , Cr 3 +);	(Mn 6 + , Mn 5 +);	(Fe 3 + , Sn 1 +);
(Cr 4 + , Cu 2 +);	(Mn 4 + , Kr 2 +);	(Fe 3 + , Ba 1 +);
(Cr 4 + , Ga 2 +);	(Mn 4 + , Zr 3 +);	(Fe 3 + , La 1 +);
(Cr 4 + , Se 2 +);	(Mn 4 + , Nb 3 +);	(Fe 3 + , Ce 1 +);
(Cr 4 + , Br 2 +);	(Mn 4 + , Sb 3 +);	(Fe 3 + , Pr 1 +);
(Cr 4 + , Y 3 +);	(Mn 4 + , Cs 2 +);	(Fe 3 + , Nd 1 +);
(Cr 4 + , Pd 2 +);	(Mn 4 + , Nd 3 +);	(Fe 3 + , Pm 1 +);
(Cr 4 + , Ag +.);	(Mn 4 + , Pm 3 +);	(Fe 3 + , Sm 1 +);
(Cr 4 + , In +.);	(Mn 4 + , Sm 3 +);	(Fe 3 + , Eu 1 +);
(Cr 4 + , I 2 +);	(Mn 4 + , Eu 3 +);	(Fe 3 + , Gd 1 +);
(Cr 4 + , Xe 2+);	(Mn 4 + , Tb 3 +);	(Fe 3 + , Tb 1 +);
(Cr 4 + , La 3+);	(Mn 4 + , Dy 3 +);	(Fe 3 + , Dy 1 +);
(Cr 4 + , Ce 3 +);	(Mn 4 + , Ho 3 +);	(Fe 3 + , Ho 1 +);
(Cr 4 + , Pr 3 +);	(Mn 4 + , Er 3 +);	(Fe 3 + , Er 1 +);
(Cr 4 + , Nd 3 +);	(Mn 4 + , Tm 3 +);	(Fe 3 + , Tm 1 +);
(Cr 4 + , Pm 3 +);	(Mn 4 + , Yb 3 +);	(Fe 3 + , Yb 1 +);
(Cr 4 + , Gd 3 +);	(Mn 4 + , Hf 3 +);	(Fe 3 + , Lu 1 +);
(Fe 3 + , Hf 1 +);	(Cu 3 + , Ni 1 +);	(Ni 3 + , Pa 1 +);
(Fe 3 + , Ta 1 +);	(Sr 3 + , Ni 1 +);	(Ni 3 + , U 1 +);
(Fe 3 + , W 1 +);	(Sb 4 + , Ni 1 +);	(Ni 3 + , Np 1 +);
(Fe 3 + , Re 1 +);	(Bi 4 + , Ni 1 +);	(Ni 3 + , Pu 1 +);
(Fe 3 + , Tl 1 +);	(Se 4 + , Ni 2 +);	(Ni 3 + , Am 1 +);

(Fe 3 + , Pb 1 +);	(Mo 5 + , Ni 2 +);	(Ni 3 + , Cm 1 +);
(Fe 3 + , Bi 1 +);	(Zn 4 + , Ni 3 +);	(Ni 3 + , Bk 1 +);
(Fe 3 + , Ra 1 +);	(Ni 3 + , Ni 1 +);	(Ni 3 + , Cf 1 +);
(Fe 3 + , Ac 1 +);	(Ni 3 + , Cu 1 +);	(Ni 3 + , Es 1 +);
(Fe 3 + , Th 1 +);	(Ni 3 + , Ga 1 +);	(Ni 4 + , As 3 +);
(Fe 3 + , Pa 1 +);	(Ni 3 + , Ge 1 +);	(Cu 3 + , Cu 1 +);
(Fe 3 + , U 1 +);	(Ni 3 + , Sr 1 +);	(Sr 3 + , Cu 1 +);
(Fe 3 + , Np 1 +);	(Ni 3 + , Y 1 +);	(Sb 4 + , Cu 1 +);
(Fe 3 + , Pu 1 +);	(Ni 3 + , Zr 1 +);	(Bi 4 + , Cu 1 +);
(Fe 3 + , Am 1 +);	(Ni 3 + , Nb 1 +);	(Se 4 + , Cu 2 +);
(Fe 3 + , Cm 1 +);	(Nb 5 + , Ni 4 +);	(Mo 5 + , Cu 2 +);
(Fe 3 + , Bk 1 +);	(Ni 3 + , Mo 1 +);	(Te 5 + , Cu 2 +);
(Fe 3 + , Cf 1 +);	(Ni 3 + , Tc 1 +);	(Cu 3 + , Cu 1 +);
(Fe 3 + , Es 1 +);	(Ni 3 + , Ru 1 +);	(Cu 5 + , Cu 4 +);
(Fe 4 + , As 3 +);	(Ni 3 + , Rh 1 +);	(Cu 3 + , Ga 1 +);
(Fe 4 + , Rb 2 +);	(Ni 3 + , Ag 1 +);	(Cu 3 + , Ge 1 +);
(Fe 4 + , Nb 3 +);	(Ni 3 + , In 1 +);	(Cu 3 + , Sr 1 +);
(Fe 4 + , o 3 +);	(Ni 3 + , Sn 1 +);	(Cu 3 + , Y 1 +);
(Fe 4 + , In 3 +);	(Ni 3 + , Ba 1 +);	(Cu 3 + , Zr 1 +);
(Fe 4 + , Sb 3 +);	(Ni 3 + , La 1 +);	(Cu 3 + , Nb 1 +);
(Fe 4 + , Te 3 +);	(Ni 3 + , Ce 1 +);	(Cu 3 + , Mo 1 +);
(Fe 4 + , Cs 2 +);	(Ni 3 + , Pr 1 +);	(Cu 3 + , Tc 1 +);
(Fe 4 + , Eu 3 +);	(Ni 3 + , Nd 1 +);	(Cu 3 + , Ru 1 +);
(Fe 4 + , Yb 3 +);	(Ni 3 + , Pm 1 +);	(Cu 3 + , Rh 1 +);
(Fe 4 + , Bi 3 +);	(Ni 3 + , Sm 1 +);	(Cu 3 + , Pd 1 +);
(Ni 3 + , Co 1 +);	(Ni 3 + , Eu 1 +);	(Cu 3 + , Ag 1 +);
(Cu 3 + , Co 1 +);	(Ni 3 + , Gd 1 +);	(Cu 3 + , In 1 +);
(Sr 3 + , Co 1 +);	(Ni 3 + , Tb 1 +);	(Cu 3 + , Sn 1 +);
(Sb 4 + , Co 1 +);	(Ni 3 + , Dy 1 +);	(Cu 3 + , Ba 1 +);
(Bi 4 + , Co 1 +);	(Ni 3 + , Ho 1 +);	(Cu 3 + , La 1 +);
(Ga 3 + , Co 2 +);	(Ni 3 + , Er 1 +);	(Cu 3 + , Ce 1 +);
(Se 5 + , Co 3 +);	(Ni 3 + , Tm 1 +);	(Cu 3 + , Pr 1 +);
(Zr 4 + , Co 3 +);	(Ni 3 + , Yb 1 +);	(Cu 3 + , Nd 1 +);
(Co 3 + , Rb 1 +);	(Ni 3 + , Lu 1 +);	(Cu 3 + , Pm 1 +);
(Co 3 + , Cs 1 +);	(Ni 3 + , Hf 1 +);	(Cu 3 + , Sm 1 +);
(Co 4 + , Ga 3 +);	(Ni 3 + , Ta 1 +);	(Cu 3 + , Eu 1 +);
(Co 4 + , Se 3 +);	(Ni 3 + , W 1 +);	(Cu 3 + , Gd 1 +);
(Co 4 + , Tc 3 +);	(Ni 3 + , Re 1 +);	(Cu 3 + , Tb 1 +);
(Co 4 + , Rh 3 +);	(Ni 3 + , Tl 1 +);	(Cu 3 + , Dy 1 +);
(Co 4 + , Sn 3 +);	(Ni 3 + , Pb 1 +);	(Cu 3 + , Ho 1 +);
(Co 4 + , Xe 3 +);	(Ni 3 + , Bi 1 +);	(Cu 3 + , Er 1 +);
(Co 4 + , Tl 3 +);	(Ni 3 + , Ra 1 +);	(Cu 3 + , Tm 1 +);
(Co 4 + , Pb 3 +);	(Ni 3 + , Ac 1 +);	(Cu 3 + , Yb 1 +);
(Ni 3 + , Ni 1 +);	(Ni 3 + , Th 1 +);	(Cu 3 + , Lu 1 +);
(Cu 3 + , Hf 1 +);	(Zn 3 + , Er 2 +);	(Y 4 + , As 3 +);
(Cu 3 + , Ta 1 +);	(Zn 3 + , Tm 2 +);	(As 4 + , Zr 2 +);
(Cu 3 + , W 1 +);	(Zn 3 + , Yb 2 +);	(As 4 + , Nb 2 +);
(Cu 3 + , Re 1 +);	(Zn 3 + , Ir 1 +);	(As 4 + , Mo 2 +);
(Cu 3 + , Tl 1 +);	(Zn 3 + , Pt 1 +);	(As 4 + , Tc 2 +);

(Cu 3 + , Pb 1 +);	(Zn 3 + , Au 1 +);	(As 4 + , Ru 2 +);
(Cu 3 + , Bi 1 +);	(Zn 3 + , Hg 1 +);	(As 4 + , Cd 2 +);
(Cu 3 + , Po 1 +);	(Zn 3 + , Rn 1 +);	(As 4 + , Sn 2 +);
(Cu 3 + , Ra 1 +);	(Zn 3 + , Ra 2 +);	(As 4 + , Sb 2 +);
(Cu 3 + , Ac 1 +);	(In 3 + , Ga 1 +);	(As 4 + , Lu 2 +);
(Cu 3 + , Th 1 +);	(Sb 4 + , Ga 1 +);	(As 4 + , Hf 2 +);
(Cu 3 + , Pa 1 +);	(Bi 4 + , Ga 1 +);	(As 4 + , Pb 2 +);
(Cu 3 + , U 1 +);	(Se 4 + , Ga 2 +);	(As 4 + , Bi 2 +);
(Cu 3 + , Np 1 +);	(Mo 5 + , Ga 2 +);	(As 5 + , Kr 6 +);
(Cu 3 + , Pu 1 +);	(Te 5 + , Ga 2 +);	(Sr 3 + , Se 1 +);
(Cu 3 + , Am 1 +);	(Ga 3 + , Ge 2 +);	(Te 4 + , Se 1 +);
(Cu 3 + , Cm 1 +);	(Ga 3 + , Kr 1 +);	(Se 4 + , Se 2 +);
(Cu 3 + , Bk 1 +);	(Ga 3 + , Nb 2 +);	(Mo 5 + , Se 2 +);
(Cu 3 + , Cf 1 +);	(Ga 3 + , Mo 2 +);	(Te 5 + , Se 2 +);
(Sr 3 + , Zn 1 +);	(Ga 3 + , Tc 2 +);	(Y 5 + , Se 4 +);
(Sb 4 + , Zn 1 +);	(Ga 3 + , Ru 2 +);	(Se 4 + , Se 2 +);
(Te 4 + , Zn 1 +);	(Ga 3 + , Cd 2 +);	(Se 4 + , Y 3 +);
(Bi 4 + , Zn 1 +);	(Ga 3 + , Sn 2 +);	(Se 4 + , Rh 2 +);
(Se 4 + , Zn 2 +);	(Ga 3 + , Sb 2 +);	(Se 4 + , Pd 2 +);
(Kr 4 + , Zn 2 +);	(Ga 3 + , Lu 2 +);	(Se 4 + , Ag 2 +);
(Zn 3 + , Zn 1 +);	(Ga 3 + , Hf 2 +);	(Se 4 + , In 2 +);
(Zn 5 + , Zn 4 +);	(Ga 3 + , Pb 2 +);	(Se 4 + , Te 2 +);
(Zn 3 + , As 1 +);	(Ga 3 + , Bi 2 +);	(Se 4 + , I 2 +);
(Zn 3 + , Se 1 +);	(Sr 3 + , Ge 1 +);	(Se 4 + , Xe 2 +);
(Zn 3 + , Br 1 +);	(Sb 4 + , Ge 1 +);	(Se 4 + , La 3 +);
(Zn 3 + , Sr 2 +);	(Bi 4 + , Ge 1 +);	(Se 4 + , Ce 3 +);
(Zn 3 + , Y 2 +);	(As 4 + , Ge 2 +);	(Se 4 + , Pr 3 +);
(Zn 3 + , Cd 1 +);	(Se 5 + , Ge 3 +);	(Se 4 + , Gd 3 +);
(Sb 5 + , Zn 4 +);	(Zr 4 + , Ge 3 +);	(Se 4 + , Lu 3 +);
(Zn 3 + , Te 1 +);	(Ge 4 + , Ge 4 +);	(Se 4 + , Pt 2 +);
(Zn 3 + , I 1 +);	(Ge 4 + , Ge 4 +);	(Se 4 + , Au 2 +);
(Zn 3 + , Xe 1 +);	(Ge 4 + , Se 4 +);	(Se 4 + , Hg 2 +);
(Zn 3 + , Ba 2 +);	(Ge 4 + , Sr 3 +);	(Se 4 + , Tl 2 +);
(Zn 3 + , La 2 +);	(Ge 4 + , Mo 4 +);	(Se 5 + , Zr 4 +);
(Zn 3 + , Ce 2 +);	(Ge 4 + , Sb 4 +);	(Se 5 + , Pd 3 +);
(Zn 3 + , Pr 2 +);	(Ge 4 + , Gd 4 +);	(Se 5 + , Ag 3 +);
(Zn 3 + , Nd 2 +);	(Ge 4 + , Yb 4 +);	(Se 5 + , I 3 +);
(Zn 3 + , Pm 2 +);	(Ge 4 + , Lu 4 +);	(Se 5 + , Xe 3 +);
(Zn 3 + , Sm 2 +);	(Ge 4 + , Bi 4 +);	(Se 5 + , Hf 4 +);
(Zn 3 + , Eu 2 +);	(Br 4 + , As 1 +);	(Se 5 + , Hg 3 +);
(Zn 3 + , Gd 2 +);	(Sr 3 + , As 1 +);	(Se 5 + , Pb 3 +);
(Zn 3 + , Tb 2 +);	(Te 4 + , As 1 +);	(Se 6 + , Sr 7 +);
(Zn 3 + , Dy 2 +);	(Se 4 + , As 2 +);	(Se 6 + , Sb 6 +);
(Zn 3 + , Ho 2 +);	(Mo 5 + , As 2 +);	(Y 3 + , Br 1 +);
(Mo 4 + , Br 1 +);	(Y 4 + , Te 3 +);	(Mo 5 + , Gd 3 +);
(Te 4 + , Br 1 +);	(Y 4 + , Tl 3 +);	(Mo 5 + , Lu 3 +);
(Sn 4 + , Br 2 +);	(In 3 + , Zr 1 +);	(Mo 5 + , Pt 2 +);
(Pb 4 + , Br 2 +);	(Sb 4 + , Zr 1 +);	(Mo 5 + , Au 2 +);
(Sb 5 + , Br 5 +);	(Bi 4 + , Zr 1 +);	(Mo 5 + , Hg 2 +);

(In 3 + , Sr 1 +);	(Mo 4 + , Zr 2 +);	(Mo 5 + , Tl 2 +);
(Sb 4 + , Sr 1 +);	(Sn 4 + , Zr 3 +);	(In 3 + , Tc 1 +);
(Bi 4 + , Sr 1 +);	(Te 5 + , Zr 3 +);	(Sb 4 + , Tc 1 +);
(Mo 4 + , Sr 2 +);	(Zr 4 + , Zr 4 +);	(Bi 4 + , Tc 1 +);
(Te 4 + , Sr 2 +);	(Zr 4 + , Zr 4 +);	(In 3 + , Ru 1 +);
(Sr 3 + , Zr 1 +);	(Zr 4 + , Rh 3 +);	(Sb 4 + , Ru 1 +);
(Sr 3 + , Nb 1 +);	(Zr 4 + , Pd 3 +);	(Bi 4 + , Ru 1 +);
(Sr 3 + , Mo 1 +);	(Zr 4 + , Hf 4 +);	(Sb 4 + , Rh 1 +);
(Sr 3 + , Tc 1 +);	(Zr 4 + , Pb 3 +);	(Bi 4 + , Rh 1 +);
(Sr 3 + , Ru 1 +);	(In 3 + , Nb 1 +);	(Sb 4 + , Pd 1 +);
(Sr 3 + , Rh 1 +);	(Sb 4 + , Nb 1 +);	(Te 4 + , Pd 1 +);
(Sr 3 + , Pd 1 +);	(Bi 4 + , Nb 1 +);	(Bi 4 + , Pd 1 +);
(Sr 3 + , Ag 1 +);	(Mo 4 + , Nb 2 +);	(Pb 4 + , Pd 2 +);
(Sr 3 + , Cd 1 +);	(Sn 4 + , Nb 3 +);	(Sb 4 + , Ag 1 +);
(Sr 3 + , Sn 1 +);	(Bi 5 + , Nb 4 +);	(Bi 4 + , Ag 1 +);
(Sr 3 + , Sb 1 +);	(Nb 4 + , Cs 1 +);	(Te 5 + , Ag 2 +);
(Sr 3 + , Te 1 +);	(In 3 + , Mo 1 +);	(Sb 4 + , Cd 1 +);
(Sr 3 + , Ba 2 +);	(Sb 4 + , Mo 1 +);	(Te 4 + , Cd 1 +);
(In 3 + , Y 1 +);	(Bi 4 + , Mo 1 +);	(Bi 4 + , Cd 1 +);
(Sb 4 + , Y 1 +);	(Sb 5 + , Mo 5 +);	(In 3 + , In 1 +);
(Bi 4 + , Y 1 +);	(Mo 4 + , Xe 1 +);	(Sb 4 + , In 1 +);
(Y 3 + , Y 2 +);	(Mo 4 + , La 2 +);	(Bi 4 + , In 1 +);
(Mo 4 + , Y 2 +);	(Mo 4 + , Ce 2 +);	(In 3 + , In 1 +);
(Mo 5 + , Y 3 +);	(Mo 4 + , Nd 2 +);	(In 3 + , Sn 1 +);
(Te 5 + , Y 3 +);	(Mo 4 + , Pm 2 +);	(In 3 + , Cs 1 +);
(Y 3 + , Y 2 +);	(Mo 4 + , Sm 2 +);	(In 3 + , Ba 1 +);
(Y 3 + , Zr 2 +);	(Mo 4 + , Eu 2 +);	(In 3 + , La 1 +);
(Y 3 + , Nb 2 +);	(Mo 4 + , Gd 2 +);	(In 3 + , Ce 1 +);
(Y 3 + , Sn 2 +);	(Mo 4 + , Tb 2 +);	(In 3 + , Pr 1 +);
(Y 3 + , Eu 2 +);	(Mo 4 + , Dy 2 +);	(In 3 + , Nd 1 +);
(Y 3 + , Gd 2 +);	(Mo 4 + , Ho 2 +);	(In 3 + , Pm 1 +);
(Y 3 + , Tb 2 +);	(Mo 4 + , Er 2 +);	(In 3 + , Sm 1 +);
(Y 3 + , Dy 2 +);	(Mo 4 + , Tm 2 +);	(In 3 + , Eu 1 +);
(Y 3 + , Ho 2 +);	(Mo 4 + , Yb 2 +);	(In 3 + , Gd 1 +);
(Y 3 + , Er 2 +);	(Mo 4 + , Lu 2 +);	(In 3 + , Tb 1 +);
(Y 3 + , Tm 2 +);	(Mo 4 + , Rn 1 +);	(In 3 + , Dy 1 +);
(Y 3 + , Yb 2 +);	(Mo 5 + , Rh 2 +);	(In 3 + , Ho 1 +);
(Y 3 + , Lu 2 +);	(Mo 5 + , Pd 2 +);	(In 3 + , Er 1 +);
(Y 3 + , Hf 2 +);	(Mo 5 + , In 2 +);	(In 3 + , Tm 1 +);
(Y 3 + , Pb 2 +);	(Mo 5 + , Te 2 +);	(In 3 + , Yb 1 +);
(Y 4 + , Mo 3 +);	(Mo 5 + , I 2 +);	(In 3 + , Lu 1 +);
(Y 4 + , Tc 3 +);	(Mo 5 + , Xe 2 +);	(In 3 + , Hf 1 +);
(Y 4 + , Ru 3 +);	(Mo 5 + , La 3 +);	(In 3 + , Tl 1 +);
(Y 4 + , In 3 +);	(Mo 5 + , Ce 3 +);	(In 3 + , Bi 1 +);
(In 3 + , Ra 1 +);	(Sb 4 + , Hf 1 +);	(Te 4 + , Ra 2 +);
(In 3 + , Ac 1 +);	(Sb 4 + , Ta 1 +);	(Fe 3 + , V 1 +);
(In 3 + , Th 1 +);	(Sb 4 + , W 1 +);	(Ni 3 + , V 1 +);
(In 3 + , Pa 1 +);	(Sb 4 + , Re 1 +);	(Cu 3 + , V 1 +);
(In 3 + , U 1 +);	(Sb 4 + , Os 1 +);	(Sr 3 + , V 1 +);

(In 3 + , Np 1 +);	(Sb 4 + , Ir 1 +);	(In 3 + , V 1 +);
(In 3 + , Pu 1 +);	(Sb 4 + , Pt 1 +);	(Sb 4 + , V 1 +);
(In 3 + , Am 1 +);	(Sb 4 + , Au 1 +);	(Bi 4 + , V 1 +);
(In 3 + , Cm 1 +);	(Sb 4 + , Tl 1 +);	(V 4 + , V 2 +);
(In 3 + , Bk 1 +);	(Sb 4 + , Pb 1 +);	(Ga 3 + , V 2 +);
(In 3 + , Cf 1 +);	(Sb 4 + , Bi 1 +);	(As 4 + , V 2 +);
(In 3 + , Es 1 +);	(Sb 4 + , Po 1 +);	(Y 3 + , V 2 +);
(Sb 4 + , Sn 1 +);	(Sb 4 + , Th 1 +);	(Co 4 + , V 3 +);
(Bi 4 + , Sn 1 +);	(Sb 4 + , Pa 1 +);	(Cu 4 + , V 3 +);
(Bi 5 + , Sn 4 +);	(Sb 4 + , U 1 +);	(Y 4 + , V 3 +);
(Sn 4 + , Sb 3 +);	(Sb 4 + , Np 1 +);	(Mn 5 + , V 4 +);
(Sn 4 + , Cs 2 +);	(Sb 4 + , Pu 1 +);	(Ge 4 + , V 4 +);
(Sn 4 + , Nd 3 +);	(Sb 4 + , Am 1 +);	(V 4 + , V 2 +);
(Sn 4 + , Pm 3 +);	(Sb 4 + , Cm 1 +);	(V 4 + , Cr 2 +);
(Sn 4 + , Sm 3 +);	(Sb 4 + , Bk 1 +);	(Sr 3 + , Hf 1 +);
(Sn 4 + , Eu 3 +);	(Sb 4 + , Cf 1 +);	(Sr 3 + , Ta 1 +);
(Sn 4 + , Tb 3 +);	(Sb 4 + , Es 1 +);	(Sr 3 + , W 1 +);
(Sn 4 + , Dy 3 +);	(Sb 5 + , e 5 +);	(Sr 3 + , Re 1 +);
(Sn 4 + , Ho 3 +);	(Te 4 + , Te 1 +);	(Sr 3 + , Os 1 +);
(Sn 4 + , Er 3 +);	(Bi 4 + , Te 1 +);	(Sr 3 + , Ir 1 +);
(Sn 4 + , Tm 3 +);	(Pb 4 + , Te 2 +);	(Sr 3 + , Pt 1 +);
(Sn 4 + , Yb 3 +);	(Te 4 + , Te 1 +);	(Sr 3 + , Au 1 +);
(Sn 4 + , Hf 3 +);	(Te 4 + , I 1 +);	(Sr 3 + , Pb 1 +);
(Sn 4 + , Bi 3 +);	(Te 4 + , Ba 2 +);	(Sr 3 + , Bi 1 +);
(Sb 4 + , Sb 1 +);	(Te 4 + , La 2 +);	(Sr 3 + , Po 1 +);
(Te 4 + , Sb 1 +);	(Te 4 + , Ce 2 +);	(Sr 3 + , Es 1 +);
(Bi 4 + , Sb 1 +);	(Te 4 + , Pr 2 +);	(Sr 4 + , Zr 3 +).
(Sb 4 + , Sb 1 +);	(Te 4 + , Nd 2 +);	(Te 4 + , Ir 1 +);
(Sb 4 + , Te 1 +);	(Te 4 + , Pm 2 +);	(Te 4 + , Pt 1 +);
(Sb 4 + , La 1 +);	(Te 4 + , Sm 2 +);	(Te 4 + , Au 1 +);
(Sb 4 + , Ce 1 +);	(Te 4 + , Eu 2 +);	(Te 4 + , Hg 1 +);
(Sb 4 + , Pr 1 +);	(Te 4 + , Gd 2 +);	(Te 4 + , Po 1 +);
(Sb 4 + , Nd 1 +);	(Te 4 + , Tb 2 +);	(Te 4 + , Rn 1 +);
(Sb 4 + , Pm 1 +);	(Te 4 + , Dy 2 +);	(Sb 4 + , Ho 1 +);
(Sb 4 + , Sm 1 +);	(Te 4 + , Ho 2 +);	(Sb 4 + , Er 1 +);
(Sb 4 + , Eu 1 +);	(Te 4 + , Er 2 +);	(Sb 4 + , Tm 1 +);
(Sb 4 + , Gd 1 +);	(Te 4 + , Tm 2 +);	(Sb 4 + , Yb 1 +); and
(Sb 4 + , Tb 1 +);	(Te 4 + , Os 1 +);	(Sb 4 + , Lu 1 +).
(Sb 4 + , Dy 1 +);		

81. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst comprises at least one selected from the group consisting of: Na^{+}, Cr^{3+}, As^{3+}, Nb^{4+}, and La^{3+}.

82. (Previously Presented) A reactor according to claim 12, wherein said source of

catalyst is contained in said vessel.

83. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst is contained in a boat connected to said vessel.

84. (Previously Presented) A reactor according to claim 12, wherein said source of catalyst is contained in a catalyst reservoir associated with said vessel.

85. (Previously Presented) A reactor according to claim 12, further comprising a heater for heating said source of catalyst.

86. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula selected from the group of formulae consisting of MH, MH_2, and M_2H_2 wherein M is an alkali cation and H is selected from the group consisting of increased binding energy hydride ions, hydrino atoms and dihydrino molecules.

87. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MH_n wherein n is 1 or 2, M is an alkaline earth cation and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

88. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MHX wherein M is an alkali cation, X is one of a neutral atom, a molecule, or a singly negatively charged anion, and H is elected from the group consisting of increased binding energy hydride ions and hydrino atoms.

89. (Previously Presented) A reactor according to claim 88, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

90. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MHX wherein M is an alkaline earth cation, X is a singly negatively charged anion, and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

91. (Previously Presented) A reactor according to claim 90, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

92. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MHX wherein M is an alkaline earth cation, X is a doubly negatively charged anion, and H is a hydrino atom.

93. (Previously Presented) A reactor according to claim 92, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

94. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2HX wherein M is an alkali cation, X is a singly negatively charged anion, and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

95. (Previously Presented) A reactor according to claim 94, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

96. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MH_n wherein n is an integer from 1 to 5, M is an alkali cation and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

97. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2H_n wherein n is an integer from 1 to 4, M is an alkaline earth cation and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

98. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2XH_n wherein n is an integer from 1 to 3, M is an alkaline earth cation, X is a singly negatively charged anion, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

99. (Previously Presented) A reactor according to claim 98, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

100. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $M_2X_2H_n$ wherein n is 1 or 2, M is an alkaline earth cation, X is a singly negatively charged anion, and the hydrogen content H_n comprises at least one increased binding

energy hydrogen species.

101. (Previously Presented) A reactor according to claim 10, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

102. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2X_3H wherein M is an alkaline earth cation, X is a singly negatively charged anion, and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

103. (Previously Presented) A reactor according to claim 102, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

104. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2XH_n wherein n is 1 or 2, M is an alkaline earth cation, X is a doubly negatively charged anion, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

105. (Previously Presented) A reactor according to claim 104, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

106. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $M_2XX'H$

wherein M is an alkaline earth cation, X is a singly negatively charged anion, X' is a doubly negatively charged anion, and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

107. (Previously Presented) A reactor according to claim 106, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

108. (Previously Presented) A reactor according to claim 106, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

109. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MM'H_n$ wherein n is an integer from 1 to 3, M is an alkaline earth cation, M' is an alkali metal cation, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

110. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MM'XH_n$ wherein n is 1 to 2, M is an alkaline earth cation, M' is an alkali metal cation, X is a singly negatively charged anion, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

111. (Previously Presented) A reactor according to claim 110, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

112. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MM'XH where M is an alkaline earth cation, M' is an alkali metal cation, X is a doubly negatively charged anion, and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

113. (Previously Presented) A reactor according to claim 112, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

114. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MM'XX'H where M is an alkaline earth cation, M' is an alkali metal cation, X and X' are each a singly negatively charged anion, and H is selected from the group consisting of increased binding energy hydride ions and hydrino atoms.

115. (Previously Presented) A reactor according to claim 114, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

116. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula H_nS wherein n is 1 or 2, and the hydrogen content of H_n comprises at least one increased binding energy hydrogen species.

117. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MXM'H_n$ wherein

n is an integer from 1 to 5;

M is an alkali or alkaline earth cation;

X is a singly negatively charged anion or a doubly negatively charged anion;

M' is selected from the group consisting of Si, Al, Ni, the transition elements, the inner transition elements, and the rare earth elements; and

the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

118. (Previously Presented) A reactor according to claim 117, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

119. (Previously Presented) A reactor according to claim 117, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

120. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MAlH_n$ wherein n is an integer from 1 to 6, M is an alkali or alkaline earth cation, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

121. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MH_n wherein:

n is an integer from 1 to 6;

M is selected from the group consisting of the transition elements, the inner transition elements, and the rare earth element cations and nickel; and

the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

122. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MNiH_n$ wherein:

n is an integer from 1 to 6;

M is selected from the group consisting of alkali cations, alkaline earth cations, silicon, and aluminum; and

the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

123. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MM'H_n$ wherein:

n is an integer from 1 to 6;

M is selected from the group consisting of alkali cations, alkaline earth cations, silicon, and aluminum;

M' is selected from the group consisting of the transition elements, the inner transition elements, and rare earth element cations; and

the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

124. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2SiH_n wherein n is an integer from 1 to 8, M is an alkali or alkaline earth cation, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

125. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula Si_2H_n wherein

n is an integer from 1 to 8, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

126. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula SiH_n wherein n is an integer from 1 to 8, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

127. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula TiH_n wherein n is an integer from 1 to 4, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

128. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula Al_2H_n wherein n is an integer from 1 to 4 and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

129. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MXAlX'H_n$ wherein n is 1 or 2, M is an alkali or alkaline earth cation, X and X' are each either a singly negatively charged anion or a doubly negatively charged anion, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

130. (Previously Presented) A reactor according to claim 129, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

131. (Previously Presented) A reactor according to claim 129, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

132. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MXSiX'H_n$ wherein n is 1 or 2, M is an alkali or alkaline earth cation, X and X' are each either a singly negatively charged anion or a doubly negatively charged anion, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

133. (Previously Presented) A reactor according to claim 132, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

134. (Previously Presented) A reactor according to claim 132, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

135. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula SiO_2H_n wherein n is an integer from 1 to 6 and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

136. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula $MSiO_2H_n$ wherein n is an integer from 1 to 6, M is an alkali or alkaline earth cation, and the

hydrogen content H_n comprises at least one increased binding energy hydrogen species.

137. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula MSi_2H_n wherein n is an integer from 1 to 6, M is an alkali or alkaline earth cation, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

138. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having the formula M_2SiH_n wherein n is an integer from 1 to 8, M is an alkali or alkaline earth cation, and the hydrogen content H_n comprises at least one increased binding energy hydrogen species.

139. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $[KH_mKCO_3]_n$ wherein m and n are each an integer and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

140. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $[KH_mKNO_3]^+_n$ nX^- wherein m and n are each an integer, X is a singly negatively charged anion, and the hydrogen content of H_m of the compound comprises at least one increased binding energy hydrogen species.

141. (Previously Presented) A reactor according to claim 140, wherein said singly negatively charged anion is selected from the group consisting of halogen ions,

hydroxide ions, hydrogen carbonate ions, and nitrate ions.

142. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $[KHKNO_3]_n$ wherein n is an integer and the hydrogen content *H* of the compound comprises at least one said binding energy hydrogen species.

143. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $[KHKOH]_n$ wherein n is an integer and the hydrogen content *H* of the compound comprises at least one said binding energy hydrogen species.

144. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $[MH_mM^1X]_n$ wherein m and n are each an integer, M and M^1 are each an alkali or alkaline earth cation, X is a singly or doubly negatively charged anion, and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

145. (Previously Presented) A reactor according to claim 144, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

146. (Previously Presented) A reactor according to claim 144, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

147. (Previously Presented) A reactor according to claim 1, wherein said at least one

other element is selected to provide a compound having a formula $[MH_mM^1X^1]^+_n\ nX^-$ wherein m and n are each an integer, M and M^1 are each an alkali or alkaline earth cation, X and X^1 are a singly or doubly negatively charged anion, and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

148. (Previously Presented) A reactor according to claim 147, wherein said singly negatively charged anion is selected from the group consisting of halogen ions, hydroxide ions, hydrogen carbonate ions, and nitrate ions.

149. (Previously Presented) A reactor according to claim 147, wherein said doubly negatively charged anion is selected from the group consisting of carbonate ions and sulfate ions.

150. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula Si_nH_{4n} wherein n is an integer and the hydrogen content H_{4n} of the compound comprises at least one increased binding energy hydrogen species.

151. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula Si_nH_{3n} wherein n is an integer and the hydrogen content H_{3n} of the compound comprises at least one increased binding energy hydrogen species.

152. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $Si_nH_{3n}O_m$ wherein n and m are integers and the hydrogen content H_{3n} of the compound comprises at least one increased binding energy hydrogen species.

153. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $Si_xH_{4x-2y}O_y$ wherein x and y are each an integer and the hydrogen content H_{4x-2y} of the compound comprises at least one increased binding energy hydrogen species.

154. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $Si_xH_{4x}O_y$ wherein x and y are each an integer and the hydrogen content H_{4x} of the compound comprises at least one increased binding energy hydrogen species.

155. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $Si_nH_{4n} \cdot H_2O$ wherein n is an integer and the hydrogen content H_{4n} of the compound comprises at least one increased binding energy hydrogen species.

156. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula Si_nH_{2n+2} wherein n is an integer and the hydrogen content H_{2n+2} of the compound comprises at least one increased binding energy hydrogen species.

157. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $Si_xH_{2x+2}O_y$ wherein x and y are each an integer and the hydrogen content H_{2x+2} of the compound comprises at least one increased binding energy hydrogen species.

158. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $Si_nH_{4n-2}O$

wherein n is an integer and the hydrogen content H_{4n-2} of the compound comprises at least one increased binding energy hydrogen species.

159. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $MSi_{4n}H_{10n}O_n$ wherein n is an integer, M is an alkali or alkaline earth cation, and the hydrogen content H_{10n} of the compound comprises at least one increased binding energy hydrogen species.

160. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $MSi_{4n}H_{10n}O_{n+1}$ wherein n is an integer, M is an alkali or alkaline earth cation, and the hydrogen content H_{10n} of the compound comprises at least one increased binding energy hydrogen species.

161. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $M_qSi_nH_mO_p$ wherein q, n, m, and p are integers, M is an alkali or alkaline earth cation, and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

162. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $M_qSi_nH_m$ wherein q, n, and m are integers, M is an alkali or alkaline earth cation, and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

163. (Previously Presented) A reactor according to claim 1, wherein said at least one

other element is selected to provide a compound having a formula $Si_nH_mO_p$ wherein n, m, and p are integers, and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

164. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula Si_nH_m wherein n and m are integers, and the hydrogen content H_m of the compound comprises at least one increased binding energy hydrogen species.

165. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $MSiH_n$ wherein n is an integer from 1 to 8, M is an alkali or alkaline earth cation, and the hydrogen content H_n of the compound comprises at least one increased binding energy hydrogen species.

166. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula $MSiO_2H_n$ wherein n is an integer from 1 to 6, M is an alkali or alkaline earth cation, and the hydrogen content H_n of the compound comprises at least one increased binding energy hydrogen species.

167. (Previously Presented) A reactor according to claim 1, wherein said at least one other element is selected to provide a compound having a formula MSi_2H_n wherein n is an integer from 1 to 14, M is an alkali or alkaline earth cation, and the hydrogen content H_n of the compound comprises at least one increased binding energy hydrogen species.

168. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said vessel is capable of containing a vacuum or pressures greater than atmospheric.

169. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said vessel comprises stainless steel.

170. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said vessel comprises molybdenum.

171. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said vessel comprises tungsten.

172. (Previously Presented) A reactor according to any one of claims 1 and 5-21, wherein said reactor comprises an electrolytic cell.

173. (Previously Presented) A reactor according to claim 15, wherein n is an integer selected from the range of 1 to 100 for H_n and H_n^- and n is an integer selected from the range of 2 to 100 for H_n^+.

174. (Previously Presented) A reactor according to claim 1, wherein said reactor comprises an electrolytic cell comprising a cathode, an anode, an electrolytic solution, a power supply for providing a current to said cathode and anode, current control structure to control said current, and pressure control structure to control the pressure in said vessel.

175. (Previously Presented) A reactor according to claim 174, wherein said pressure control structure comprises a valve.

176. (Previously Presented) A reactor according to claim 174, wherein said cell comprises a reverse fuel cell geometry.

177. (Previously Presented) A reactor according to claim 174, further comprising an electric or magnetic field generator.

178. (Previously Presented) A reactor according to claim 174, wherein said cathode comprises at least one selected from the group consisting of nickel, titanium, iron, and graphite.

179. (Previously Presented) A reactor according to claim 174, wherein said anode comprises at least one selected from the group consisting nickel, platinized titanium, and platinum.

180. (Previously Presented) A reactor according to claim 174, wherein said cathode comprises a conductor or semiconductor.

181. (Previously Presented) A reactor according to claim 174, wherein said cathode comprises at least one selected from the group consisting of transition elements, actinide elements, lanthanide elements, group IIIB elements and group IVB elements.

182. (Previously Presented) A reactor according to claim 174, wherein said electrolytic solution comprises aqueous potassium carbonate.

183. (Previously Presented) A reactor according to claim 174, wherein said electrolyte comprises an oxyanion.

184. (Previously Presented) A reactor according to claim 183, wherein said oxyanion comprises at least one selected from the group of phosphate, hydrogen phosphate, sulfate, and carbonate.

185. (Previously Presented) A reactor according to claim 174, wherein said current control means is capable of providing intermittent current of an intermittent square-wave having an offset voltage of approximately 2.5 volts to 2.2 volts.

186. (Previously Presented) A reactor according to claim 174, further comprising means for controlling the current density at the cathode.

187. (Previously Presented) A reactor according to claim 1, wherein said reactor comprises a pressurized hydrogen gas cell.

188. (Previously Presented) A reactor according to claim 187, wherein said reactor further comprises a heater.

189. (Previously Presented) A reactor according to claim 187, further comprising pressure control structure to control the pressure in said vessel.

190. (Previously Presented) A reactor according to claim 187, wherein said pressure control structure comprises a valve.

191. (Previously Presented) A reactor according to claim 187, wherein said vessel is constructed and arranged to be capable of maintaining a pressure in the range of 10 millitorr to 100 torr.

192. (Previously Presented) A reactor according to claim 187, further comprising a hydrogen dissociator for dissociating hydrogen gas into hydrogen atoms.

193. (Previously Presented) A reactor according to claim 187, further comprising a catalyst reservoir in communication with said vessel.

194. (Previously Presented) A reactor according to claim 193, further comprising a heater for heating said catalyst reservoir.

195. (Previously Presented) A reactor according to claim 187, further comprising a catalyst boat contained in said vessel.

196. (Previously Presented) A reactor according to claim 195, further comprising a heater for heating said catalyst boat.

197. (Previously Presented) A reactor according to claim 1, wherein said reactor comprises a hydrogen gas discharge energy reactor.

198. (Previously Presented) A reactor according to claim 197, wherein said vessel comprises a hydrogen gas filled glow discharge vacuum chamber.

199. (Previously Presented) A reactor according to claim 197, wherein said vessel comprises a hydrogen gas filled glow discharge vacuum chamber, and a power supply for supplying an electrical current to said source of catalyst to control a reaction rate within said vessel.

200. (Previously Presented) A reactor according to claim 197, further comprising a heater for heating said source of catalyst and controlling a rate of reaction in said

vessel.

201. (Previously Presented) A reactor according to claim 197, wherein said vessel comprises a hydrogen gas filled glow discharge vacuum chamber, and a control valve to control the flow of hydrogen gas into said hydrogen gas filled glow discharge vacuum chamber.

202. (Previously Presented) A reactor according to claim 197, further comprising a catalyst reservoir in communication with said vessel.

203. (Previously Presented) A reactor according to claim 202, further comprising a heater for heating said catalyst reservoir.

204. (Previously Presented) A reactor according to claim 197, wherein said vessel is constructed and arranged to be capable of maintaining a pressure in the range of 10 millitorr to 100 torr.

205. (Previously Presented) A reactor according to claim 197, further comprising an anode and a cathode.

206. (Previously Presented) A reactor according to claim 205, wherein at least one of said cathode or said anode is coated with a source of catalyst.

207. (Previously Presented) A reactor according to claim 205, wherein said cathode is coated with RbI.

208. (Previously Presented) A reactor according to claim 205, wherein said anode is coated with KI.

209. (Previously Presented) A reactor according to claim 197, further comprising a catalyst boat contained in said vessel.

210. (Previously Presented) A reactor according to claim 209, further comprising a heater for heating said catalyst boat.

211. (Previously Presented) A reactor according to claim 1, wherein said reactor comprises a hydrogen plasma torch cell.

212. (Previously Presented) A reactor according to claim 211, further comprising a plasma torch and a manifold constructed and arranged to contain a plasma from said plasma torch.

213. (Previously Presented) A reactor according to claim 212, further comprising a supply line for supplying hydrogen gas to said plasma torch.

214. (Previously Presented) A reactor according to claim 212, further comprising a supply line for supplying said source of catalyst to said plasma torch.

215. (Previously Presented) A reactor according to claim 214, further comprising a catalyst reservoir for containing said source of catalyst, said catalyst reservoir being connected to said supply line.

216. (Previously Presented) A reactor according to claim 215, wherein said catalyst reservoir further comprises a magnetic stirrer.

217. (Previously Presented) A reactor according to claim 215, wherein said catalyst

reservoir further comprises a heater.

218. (Previously Presented) A reactor according to claim 212, further comprising a controller for controlling the flow of hydrogen to said plasma torch.

219. (Previously Presented) A reactor according to claim 212, further comprising a controller for controlling the flow of said source of catalyst to said plasma torch.

220. (Previously Presented) A reactor according to claim 212, further comprising a microwave generator for powering a plasma.

221. (Previously Presented) A reactor according to claim 212, further comprising a hydrino hydride compound trap.

222. (Previously Presented) A reactor according to claim 212, further comprising a pump for removing gasses from said reactor.

223. (Previously Presented) A reactor according to claim 212, further comprising a catalyst boat located in the manifold constructed and arranged for containing said source of catalyst.

224. (Previously Presented) A reactor according to claim 223, wherein said boat comprises a ceramic.

225. (Previously Presented) A reactor according to claim 223, further comprising a heater for heating said catalyst boat.

226. (Previously Presented) A reactor according to claim 212, further comprising a

source of plasma gas.

227. (Previously Presented) A reactor according to claim 226, wherein said plasma gas comprises argon.

228. (Previously Presented) A reactor according to claim 212, further comprising an aspirator, atomizer or nebulizer constructed and arranged to form an aerosol of catalyst.

229. (Previously Presented) A reactor according to claim 228, wherein said aspirator, atomizer or nebulizer is constructed and arranged to inject catalyst directly into a plasma in said vessel.

230. (Previously Presented) A reactor according to claim 228, wherein said aspirator, atomizer or nebulizer is constructed and arranged to inject catalyst into a plasma in said vessel using a carrier gas.

231. (Previously Presented) A reactor according to claim 212, further comprising an electron source.

232. (Previously Presented) A reactor according to claim 212, further comprising a reductant for use as an electron source in communication with said vessel.

233. (Previously Presented) A reactor according to claim 1, further comprising a computerized monitoring and control system which controls a reaction rate in the reactor.

234. (Previously Presented) A reactor according to claim 42, wherein said vessel

includes temperature controlling structure capable of maintaining an atomic hydrogen partial pressure of less than about 1 torr.

235. (Previously Presented) A reactor according to claim 42, wherein said vessel includes temperature controlling structure capable of maintaining said catalyst in molten form.

236. (Previously Presented) A reactor according to claim 42, wherein said vessel includes temperature controlling structure capable of maintaining the temperature of said vessel at about 50°C above the melting point of said catalyst.

237. (Previously Presented) A reactor according to claim 1, wherein said vessel is constructed and arranged to be capable of maintaining the hydrogen partial pressure in said vessel at about 200 millitorr.

238. (Previously Presented) A reactor according to claim 42, wherein said vessel includes temperature controlling structure capable of maintaining the temperature of said vessel at about 50°C above the melting point of the compound having the highest melting point of a plurality of compounds which comprise a source of said gaseous catalyst.

239. (Previously Presented) A reactor according to claim 1, further comprising a pump in communication with said vessel.

240. (Previously Presented) A reactor according to claim 1, further comprising a thermocouple constructed and arranged to measure a temperature in said vessel.

241. (Previously Presented) A reactor according to claim 1, further comprising

temperature controlling structure for controlling the temperature of said vessel.

242. (Previously Presented) A reactor according to claim 241, wherein said temperature controlling structure comprises at least one selected from the group consisting of an internal heater, an external heater and a heat exchanger which removes energy from said vessel.

243. (Previously Presented) A reactor according to claim 42, wherein said a source of hydrogen atoms is selected from the group consisting of hydrogen gas, water, hydrides, metal-hydrogen solutions, and hydrocarbons.

244. (Previously Presented) A reactor according to claim 243, further comprising means to disassociate water to form gaseous hydrogen atoms.

245. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprising a hot filament and a hydrogen containing gas stream.

246. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprising a hot grid and a hydrogen containing gas stream.

247. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprising a heated tungsten capillary and a hydrogen containing gas stream.

248. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprising a hydride maintained under nonequilibrium

conditions.

249. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprises an inductively coupled plasma flow tube and a hydrogen gas containing stream.

250. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprises means to reform hydrocarbons to at least one of gaseous molecular and gaseous atomic hydrogen.

251. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms further comprises a second catalyst for disassociating hydrogen molecules into hydrogen atoms.

252. (Previously Presented) A reactor according to claim 251, wherein said second catalyst comprises at least one selected from the group consisting of an element, compound, alloy or mixture of transition elements, inner transition elements, iron, platinum, palladium, zirconium, vanadium, nickel, titanium, Sc, Cr, Mn, Co, Cu, Zn, Y, Nb, Mo, Tc, Ru, Rh, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Au, Hg, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Vb, Lu, Th, Pa, U, activated charcoal, and intercalated Cs carbon.

253. (Previously Presented) A reactor according to claim 251, wherein said second catalyst is treated with an aqueous solution of K_2CO_3 and H_2O_2.

254. (Previously Presented) A reactor according to claim 251, further comprising a temperature controlling structure capable of maintaining a selected atomic hydrogen partial pressure by controlling the temperature of said second catalyst.

255. (Previously Presented) A reactor according to claim 251, further comprising a filament or grid constructed and arranged to dissociate hydrogen and to heat said second catalyst.

256. (Previously Presented) A reactor according to claim 251, further comprising means for controlling the power output of said cell.

257. (Previously Presented) A reactor according to claim 258, wherein said means for controlling the power output of said cell comprises means for controlling the temperature of said second catalyst.

258. (Previously Presented) A reactor according to claim 136, wherein said means for controlling the temperature of said second catalyst comprises a filament or grid.

259. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms comprises a source of UV light for disassociating hydrogen containing molecules to form said gaseous hydrogen atoms.

260. (Previously Presented) A reactor according to claim 42, further comprising a means for pyrolysis of hydrocarbons or water to form said gaseous hydrogen atoms.

261. (Previously Presented) A reactor according to claim 1, further comprising a flow control means for controlling the flow of a source of gaseous hydrogen atoms into said vessel.

262. (Previously Presented) A reactor according to claim 1, further comprising a flow control means for controlling the flow of hydrogen from said vessel.

263. (Previously Presented) A reactor according to claim 262, wherein said flow control means comprises a valve.

264. (Previously Presented) A reactor according to claim 1, further comprising a vacuum pump constructed and arranged for controlling the flow of hydrogen from said vessel.

265. (Previously Presented) A reactor according to claim 42, further comprising a flow control means for controlling the flow of catalyst from a catalyst reservoir to said reaction vessel.

266. (Previously Presented) A reactor according claim 42, further comprising means for controlling the flow of said gaseous catalyst from said reaction vessel.

267. (Previously Presented) A reactor according to claim 266, wherein said means for controlling the flow of said gaseous catalyst from said reaction vessel comprises a valve.

268. (Previously Presented) A reactor according to claim 266, further comprising a vacuum pump constructed and arranged for controlling the flow of said gaseous catalyst from said reaction vessel.

269. (Previously Presented) A reactor according to claim 1, further comprising a source of a nonreactive gas in communication with said vessel.

270. (Previously Presented) A reactor according to claim 269, further comprising a means for controlling the amount of a nonreactive gas in said vessel.

271. (Previously Presented) A reactor according to claim 269, further comprising flow control means for controlling the flow of a nonreactive gas into said reaction vessel.

272. (Previously Presented) A reactor according to claim 271, wherein said means for controlling the amount of nonreactive gas in said vessel comprises a valve constructed and arranged to regulate the flow of said nonreactive gas into said vessel.

273. (Previously Presented) A reactor according to claim 269, further comprising at least one of a valve or pump constructed and arranged for controlling the flow of a nonreactive gas from said reaction vessel.

274. (Previously Presented) A reactor according to claim 1, further comprising a pump in communication with said reaction vessel.

275. (Previously Presented) A reactor according to claim 42, further comprising structure for controlling the vapor pressure of said catalyst in said vessel.

276. (Previously Presented) A reactor according to claim 275, wherein said structure for controlling the vapor pressure of said catalyst comprises a heater constructed and arranged to control the temperature of said vessel.

277. (Previously Presented) A reactor according to claim 42, further comprising structure for maintaining a selected vapor pressure of said catalyst in said vessel.

278. (Previously Presented) A reactor according to claim 277, wherein said structure for maintaining a selected vapor pressure of said catalyst comprises a valve

constructed and arranged for controlling the flow of said catalyst from catalyst reservoir and a valve constructed and arranged for controlling the flow of said catalyst from said vessel.

279. (Previously Presented) A reactor according to claim 1, further comprising a valve for releasing hydrino atoms having a binding energy of about $E_b = 13.6/n^2$ eV, where n is a fraction whose numerator is 1 and denominator is an integer greater than 1 or a compound containing said hydrino atoms from said vessel.

280. (Previously Presented) A reactor according to claim 42, further comprising means for adsorbing energy released from said hydrogen atoms reacted to form hydrinos.

281. (Previously Presented) A reactor according to claim 1, wherein said vessel comprises an internal combustion chamber.

282. (Previously Presented) A reactor according to claim 281, wherein said internal combustion chamber is an engine cylinder.

283. (Previously Presented) A reactor according to claim 1, further comprising means for controlling the power output of said reactor.

284. (Previously Presented) A reactor according to claim 42, further comprising means for controlling the power output of said reactor.

285. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the amount of said catalyst.

286. (Previously Presented) A reactor according to claim 285, wherein said means for controlling the amount of catalyst comprises means for controlling the temperature of said vessel and said catalyst is selected to have a vapor pressure dependent upon the temperature of said vessel.

287. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the flow of a source of catalyst from said vessel.

288. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the temperature of a source of catalyst.

289. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the amount of said gaseous hydrogen atoms or a source of gaseous hydrogen atoms in said vessel.

290. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the flow of gaseous hydrogen atoms or source of said hydrogen atoms into said vessel.

291. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the flow of gaseous hydrogen atoms or source of said hydrogen atoms from said reaction vessel.

292. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises controlling the amount of a nonreactive gas present in said vessel.

293. (Previously Presented) A reactor according to claim 292, wherein said means for controlling the amount of nonreactive gas comprises means for controlling the flow of said nonreactive gas from said reaction vessel.

294. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the flow of a hydrogen containing gas over at least one of a hot filament, a tungsten capillary heated by electron bombardment, or an inductively coupled plasma flow.

295. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the power dissipated in an inductively coupled plasma flow tube.

296. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the power dissipated in a hot filament, grid, or tungsten capillary heated by electron bombardment.

297. (Previously Presented) A reactor according to claim 284, wherein said means for controlling the power output of said reactor comprises means for controlling the temperature of a hot filament, grid or tungsten capillary heated by electron bombardment over which a hydrogen containing gas flows.

298. (Previously Presented) A reactor according to claim 284, wherein said means for

controlling the power output of said reactor comprises means for controlling the temperature of a hydride maintained under nonequilibrium conditions.

299. (Previously Presented) A reactor according to claim 1, further comprising a pressure sensor.

300. (Previously Presented) A reactor according to claim 1, further comprising means for controlling a pressure in said reactor.

301. (Previously Presented) A reactor according to claim 300, wherein said means for controlling a pressure in said reactor comprises a valve connected to said vessel.

302. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms comprises an external source in communication with said vessel.

303. (Previously Presented) An reactor according to claim 42, wherein said source of hydrogen atoms is contained within said vessel.

304. (Previously Presented) A reactor according to claim 42, further comprising a means for bringing hydrogen atoms into contact with said catalyst.

305. (Previously Presented) A reactor according to claim 42, further comprising a valve for controlling a pressure of hydrogen in the vessel.

306. (Previously Presented) A reactor according to 42, wherein said source of hydrogen atoms comprises a hydrogen containing compound and a dissociator for dissociating said hydrogen containing compound into hydrogen atoms.

307. (Previously Presented) A reactor according to claim 306, wherein said dissociator comprises UV light.

308. (Previously Presented) A reactor according to claim 306, wherein said dissociator comprises a cathode for the electrolysis of water.

309. (Previously Presented) A reactor according to claim 306, wherein said dissociator comprises at least one element selected from the group consisting of transition elements.

310. (Previously Presented) A reactor according to claim 306, wherein said dissociator comprises at least one element selected from the group consisting of inner transition elements.

311. (Previously Presented) A reactor according to claim 306, wherein said dissociator comprises at least one selected from the group consisting of Sc, Cr, Mn, Co, Cu, Zn, Y, Nb, Mo, Tc, Ru, Rh, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Au, Hg, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Vb, Lu, Th, Pa and U.

312. (Previously Presented) A reactor according to claim 306, wherein said dissociator comprises at least one selected from the group consisting of platinum, palladium, zirconium, vanadium, nickel, titanium, Sc, Cr, Mn, Co, Cu, Zn, Y, Nb, Mo, Tc, Ru, Rh, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Au, Hg, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Vb, Lu, Th, Pa, U, activated charcoal, and cesium.

313. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises H_2 gas.

314. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises a hydride.

315. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises a metal-hydrogen solution.

316. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises ^{1}H.

317. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises ^{2}H.

318. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises ^{3}H.

319. (Previously Presented) A reactor according to claim 306, wherein said hydrogen containing compound comprises a metal-hydride and said dissociator comprises a heater.

320. (Previously Presented) A reactor according to claim 319, further comprising a temperature control for controlling the decomposition rate of said metal-hydride.

321. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms comprises structure for thermal dissociation of water.

322. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms comprises at least one of ^{1}H, ^{2}H, or ^{3}H, or mixtures thereof.

323. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms is capable of providing hydrogen atoms consisting mainly of ^{1}H atoms and being substantially free of ^{2}H and ^{3}H atoms.

324. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms is capable of providing hydrogen atoms consisting mainly of ^{2}H atoms and being substantially free of ^{1}H and ^{3}H atoms.

325. (Previously Presented) A reactor according to claim 42, wherein said source of hydrogen atoms is capable of providing hydrogen atoms consisting mainly of ^{3}H atoms and being substantially free of ^{1}H and ^{2}H atoms.

326. (Previously Presented) A reactor for preparing a compound comprising at least one selected from the group consisting of KHF, KHCl, KHBr, KHI, RbHF, RrHCL, RbHBr, RbHI, CsHF, CsHCL, CsHBr, CsHI, CaHCl, CaHBr, CaHI, SrHF, SrHCL. SrHBr, and SiH, wherein the hydrogen is a hydrino atom having a binding energy of aobut 13.6/n2 eV, n is a fraction in which the numerator is 1 and denominator an integer greater than one, the reactor comprising:

a vessel,

a source of hydrogen atoms associated with the vessel;

a source of catalyst for catalyzing the reaction of hydrogen atoms to hydrino atoms associated with the vessel; and

at least one other element.

327. (New) A reactor according to claim 1, wherein the compound comprises FeH.